2016 Texas Bays and Estuaries Meeting




The University of Texas Marine Science Institute
Port Aransas, Texas
April 13-14, 2016

Texas Bays and Estuaries Meeting

TBEM

MISSION ★ ARANSAS
NATIONAL ESTUARINE RESEARCH RESERVE

The University of Texas at Austin
Marine Science Institute

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Welcome!

The University of Texas Marine Science Institute is proud to host the 12th annual Texas Bays and Estuaries Meeting. We have a great program of talks and posters this year from all around the state! We are truly excited for the great turnout.

Please remember that all campus buildings, grounds, and outdoor spaces are nonsmoking. Restrooms are located across from the auditorium in the Marine Science Education Center. Aunt Sissy's Kitchen will be providing lunch on both days and La Playa Restaurant is catering Wednesday night's dinner. Beer and wine will be available during the poster and Hors d'oeuvre session, and on the sunset cruise. You may wander freely with your drinks, but please do not leave the campus with them (unless on the boat). Presenters will be next to their posters from 5:00 to 6:30 p.m. during the poster session on Wednesday evening (April 13th) in the Lyceum.

Once again, thank you all for participating and we hope you enjoy the meeting.

See you again next year!

Jace Tunnell Dana Sjostrom Katie Swanson

Texas Bays and Estuaries Meeting Committee

Follow the meeting on social media with #TBEM2016

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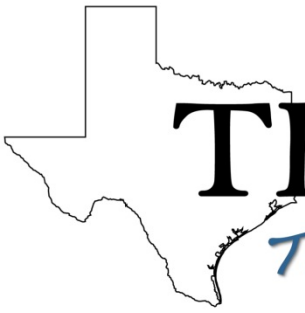

Welcome to TBEM 2016

Texas Bays and Estuaries Meeting

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Invited Speakers Biographies

Ms. Kim Albins, Gulf of Mexico Marine Debris Regional Coordinator at National Oceanic and Atmospheric Administration (NOAA)

Kimberly Page Albins joined NOAA's Marine Debris Division as the Marine Debris Regional Coordinator for the Gulf of Mexico in April of 2013. Born and raised in Mobile, AL, Kim eagerly returned home to apply over 10 years of Marine Science experience to the Gulf of Mexico's marine debris issues. She has a broad background in research, education, marine operations, and team management. From 2007-2012, Kim led the planning and implementation of the near-shore oceanography program for the Partnership for the Interdisciplinary Studies of Coastal Oceans (PISCO), a large marine research consortium in Oregon. Prior to working with PISCO, Kim worked for NOAA's Coral Reef Ecosystem Division in Hawai`i and experienced firsthand the destructive impacts of marine debris while participating in numerous marine debris removal and research cruises in the Northwestern Hawaiian Islands and other US Pacific Islands. Kim graduated with a Master of Science from the University of Hawaii at Manoa in Marine Botany, and a Bachelor of Arts from University of Hawaii at Hilo in Marine Science. She believes passionately in our collective responsibility to have a clean ocean and is working to facilitate the prevention and reduction of marine debris in the Gulf of Mexico by supporting research, education, and removal efforts.

Dr. Edward Buskey, Professor, Department of Marine Science, Fellow of Nancy Lee and Perry R. Bass Regents Chair in Marine Science, University of Texas Marine Science Institute- Port Aransas

Dr. Edward Buskey has been a faculty member in the Department of Marine Science at the University of Texas Marine Science Institute for 29 years, and serves as Associate Chair of the Department of Marine Science. He received a B.A. in biology from Brown University, a M.Sc. in zoology from the University of British Columbia and a PhD in biological oceanography from the University of Rhode Island. His areas of expertise include biological oceanography, estuarine ecology and plankton ecology, and he has participated in numerous studies in the Gulf of Mexico and estuaries of Texas since 1986. He is the Research Coordinator for the Mission-Aransas National Estuarine Research Reserve and Director of the Gulf of Mexico Research Initiative DROPPS consortium, which studies the effects of physical and chemical factors on the dispersal of oil in the marine environment and the effects of this dispersed oil on the planktonic organisms at the base of marine food webs.

Schedule

Wednesday, April 13, 2016

8:00 AM - **Registration,** Marine Science Education Center, The University of Texas Marine Science Institute, 855 East Cotter Avenue, Port Aransas Texas

9:00 AM - **Welcome and Opening Remarks-** Dr. Robert Dickey, Director, The University of Texas Marine Science Institute

HABITATS AND ECOSYSTEMS

9:15 AM - **Evaluating Strategies for Meeting Seasonal Freshwater Inflow (FWI) Targets for the San Antonio Bay – Guadalupe Estuary System**
[1]James Dodson* and [2]Joe Trungale; [1]San Antonio Bay Partnership; [2]Trungale Engineering & Science

9:30 AM - **The lability of suspended particles in northern Gulf of Mexico: Insights from pigments and amino acids in the water column and surface sediments**
Jianhong Xue*, Chunyan Ren, Shuting Liu, and Zhanfei Liu; University of Texas at Austin, Marine Science Institute

9:45 AM - **Identifying nesting habitat for Texas diamondback terrapin in the Nueces Estuary, TX**
Aaron S. Baxter*; Center for Coastal Studies at Texas A&M University—Corpus Christi

10:00 AM - **Black Mangrove Expansion into Southeast Texas Saltmarshes**
Meredith Diskin* and Delbert L. Smee; Texas A&M University – Corpus Christi (*Student Presentation*)

10:15 AM - **Salt marsh species interact with mangroves at experimental marsh-mangrove ecotonalgradient**
[1]Sayantani Dastidar***,** [1]Steven C. Pennings, [2]Anna R. Armitage, [1]Hongyu Guo, [1]Zoe Hughes, [3]Sean Charles, [3]John Kominoski, [2]Ashley Whitt, and [2]Carolyn A. Weaver; [1]University of Houston; [2]Texas A&M University at Galveston; [3]Florida International University, Miami (*Student Presentation*)

10:30 AM- **BREAK**

10:45 AM - **Community Characterization of Algal Epiphytes of Seagrasses in Proximity to Coastal Wetlands**
Melissa Fisher*, Lucas Martinez, Chelsea Miller, Whitney Roberson, and Kirk Cammarata; Texas A&M University-Corpus Christi, College of Science and Engineering, Department of Life Sciences (*Student Presentation*)

Wednesday, April 13, 2016 (continued)

11:00 AM - **Dermo disease dynamics in the eastern oysters *Crassostrea virginica* throughout the Aransas-Copano estuarine system in South Texas**
[1,2]Maria C. Rodriguez*, [1]Jennifer Beseres-Pollack, [2]John W. Tunnell, Jr.; [1]Texas A&M University – Corpus Christi; [2]Harte Research Institute for Gulf of Mexico Studies (*Student Presentation*)

11:15 AM - **Assessing the Public Attitudes and Preferences of the Mission-Aransas National Estuarine Research Reserve, Texas Using Social Valuation**
[1]Mayra Lopez*, [1]David Yoskowitz, [2]Maria Dillard, [1]Michael Starek, [1]Victoria Ramenzoni; [1]Harte Research Institute for Gulf of Mexico Studies, Texas A&M University-Corpus Christi; [2]Hollings Marine Laboratory, National Centers for Coastal Ocean Science

11:30 AM - **Texas Coastal Bend Regional Climate Change Vulnerability Assessment**
Meagan Murdock* and Jorge Brenner; The Nature Conservancy-Texas Chapter

11:45 AM - **Gulf of Mexico Research Initiative Information and Data Cooperative (GRIIDC): Adventures in Large Scale Data Management**
Lauren Showalter*, Sandra Ellis, and James Gibeaut; Harte Research Institute for Gulf of Mexico Studies at Texas A&M University-Corpus Christi

12:00 PM - **LUNCH (Catered by Aunt Sissy's Kitchen) in the Marine Science Education Center lobby.**

HABITAT RESTORATION AND STEWARDSHIP

1:00 PM - **Marine Debris in the Gulf: types, impacts and NOAA's reduction efforts**
Kim Albins; NOAA Marine Debris Program (*Invited Speaker*)

1:30 PM - **Plastic Marine Debris in the Coastal Bend**
Neil McQueen; Surfrider Foundation – Texas Coastal Bend Chapter, Skip the Plastic Project

1:45 PM - **Controlling Brazilian Peppertree: Management and Outreach Efforts of the Texas Gulf Region Cooperative Weed Management Area (CWMA)**
[1]Beau Hardegree*, [2]Mike Murphrey, [3]Katie Swanson, and [4]Hans Landel; [1]U.S. Fish and Wildlife Service; [2]Texas A&M Forest Service; [3]Mission-Aransas NERR/University of Texas Marine Science Institute; [4]Lady Bird Johnson Wildflower Center

2:00 PM - **Habitat Restoration and Enhancement of Barrier Island Woodlands in Nueces County**
[1]Scott Cross*, [2]Mary Ellen Vega, and [2]Mary Kay Skoruppa; [1]Nueces County Coastal Parks; [2]Naismith Engineering, Inc.

Wednesday, April 13, 2016 (continued)

2:15 PM - **Predicting and Responding to Petroleum Pollution in Coastal Salt Marshes**
[1]Meredith Evans*, [1]Jiqing Liu, [2]Brad E. Rosenheim, and [1]Zhanfei Liu; [1]The University of Texas at Austin, Marine Science Institute; [2]The University of South Florida (*Student Presentation*)

2:30 PM - **BREAK**

WATER QUALITY

2:45 PM - **Degradation of WAF, CEWAF, and DCEWAF in biologically enriched mesocosms**
[1]Maya E. Morales-McDevitt*, [1]Terry L. Wade, [1]Anthony Knap, [1]Gerardo Gold-Bouchot, [1]Dawei Shi, [1]Stephen T. Sweet, [2,3]Peter Santschi, [3,4]Antonietta Quigg; [1]Geochemical and Environmental Research Group, Texas A&M University, College Station; [2]Department of Marine Science, Texas A&M University, Galveston campus; [3]Department of Oceanography, Texas A&M University, College Station; [4]Department of Marine Biology, Texas A&M University, Galveston campus (*Student Presentation*)

3:00 PM - **Influence of consecutive major storm events on source of particulate organic matter in a subtropical estuary, Texas**
Nicolas Reyna*, Amber Hardison, and Zhanfei Liu; Marine Science Institute, University of Texas at Austin (*Student Presentation*)

3:15 PM - **Long-term trends and spatial variability of pCO2 in the Texas estuaries**
Melissa McCutcheon* and Xinping Hu; Texas A&M University-Corpus Christi (*Student Presentation*)

3:30 PM- **Alkalinity Dynamics in Groundwater Affected Secondary Bay in South Texas**
Melissa Trevino*, Dorina Murgulet, Xinping Hu, Audrey Douglas, and Nicholas Spalt; Texas A&M University-Corpus Christi (*Student Presentation*)

3:45 PM **BREAK**

4:00 PM - **Spatial variability in hydrologic surface connectivity between a coastal river and its floodplain**
Cesar R Castillo*, İnci Güneralp, Billy Hales, Burak Güneralp; Department of Geography, Texas A&M University (*Student Presentation*)

4:15 PM - **The role of submarine groundwater discharge (SGD) as a pathway for nutrient discharge to Nueces Bay, Texas**
Audrey Douglas*, Dorina Murgulet, Nicholas Spalt, and Melisa Trevino; Texas A&M University-Corpus Christi, Department of Physical and Environmental Sciences (*Student Presentation*)

4:30 PM - **Postulating Hydrodynamic and Geochemical Processes Associated with Nutrient Delivery in Copano Bay, Texas**
Nicholas Spalt*, Dorina Murgulet, Audrey Douglas, and Melisa Trevino; Texas A&M University-Corpus Christi (*Student Presentation*)

4:45 PM - **Mysterious Alkalinity Loss During a Drought Year (2014) in the Mission-Aransas Estuary**
Xinping Hu*, Hongming Yao, and Cory Staryk; Department of Physical and Environmental Sciences, Texas A&M University – Corpus Christi

5:00 PM - **Poster Session / Hors d'oeuvre Hour** (Catered by La Playa) located in the Marine Science Institute's Lyceum, between the main lab building and administrative building.

6:30 PM - **Poster Session Complete.** Walk to the UTMSI boat marina to start loading onto the *Mustang*.

6:45 PM - **Sunset Cruise** aboard the *Mustang.*

8:15 PM - **Return to UTMSI Boat Marina**

Thursday, April 14, 2016

8:00 AM - **Registration,** Marine Science Education Center, The University of Texas Marine Science Institute, 855 East Cotter Avenue, Port Aransas Texas

INVERTEBRATE ECOLOGY

9:00 AM - **Oyster culture potential in Texas bays and estuaries**
John Scarpa* and Joe Fox; Department of Life Sciences, Texas A&M University – Corpus Christi

9:15 AM - **Reproductive costs of an induced morphological defense in the Eastern oyster *Crassostrea virginica***
[1]Avery E. Scherer*, [1,2]Christopher E. Bird, and [1]Delbert L. Smee; [1]Texas A&M University-Corpus Christi; [2]Hawai'i Institute of marine Biology, University of Hawai'i (*Student Presentation*)

9:30 AM - **Oyster and Dermo Response to Salinity: Implications for Freshwater Inflow Standards**
Daniel Opdyke*, Deborah Chiavelli, and Elaine Darby; Anchor QEA

9:45 AM - **Wave energy reduces the abundance and size of benthic species on oyster reefs**
[1,2]Jessica Lunt, [1]Joseph W. Reustle*, and [1]Delbert L. Smee; [1]Texas A&M University- Corpus Christi; [2]Smithsonian Marine Station at Fort Pierce, Fort Pierce, FL (*Student Presentation*)

10:00 AM - **Predator boreholes in shells of the bivalve *Periploma margaritaceum* in Corpus Christi, Texas**
Fabio Moretzsohn; Department of Life Sciences, Texas A&M University-Corpus Christi

10:15 AM- **BREAK**

FISH AND FISHERIES

10:30 AM- **Quantitative relationships between sound production and abundance in estuarine spawning aggregations**
[1]Timothy J. Rowell, [2]David A. Demer, [3]Juan José Cota Nieto, [1]Octavio Aburto-Oropeza, [2]John R. Hyde, and [1,4]Brad E. Erisman*; [1]Scripps Institution of Oceanography University of California San Diego; [2]Centro para la Biodiversidad Marina y la Conservación A.C.; [3]NOAA Southwest Fisheries Science Center; [4]University of Texas Marine Science Institute

10:45 AM - **Aggregation Bias in Time Series Data**
Mark R. Fisher; Texas Parks and Wildlife Department, Coastal Fisheries

Thursday, April 14, 2016 (continued)

11:00 AM - **Diet analysis of Red Snapper, *Lutjanus campechanus*, on natural and artificial reefs in the western Gulf of Mexico**
[1]Charles H. Downey*, [1]Rachel A. Brewton, [1]Jennifer J. Wetz, [2]Matthew J. Ajemian, and [1]Gregory W. Stunz; [1]Harte Research Institute for Gulf of Mexico Studies, Texas A&M University–Corpus Christi; [2]Florida Atlantic University, Harbor Branch Oceanographic Institute (*Student Presentation*)

11:15 AM - **Ontogeny of digestive enzyme activity of pigfish (*Orthopristis chrysoptera*)**
Kathryn Thompson*, Cynthia K. Faulk, and Lee A. Fuiman; The University of Texas at Austin Marine Science Institute, Fisheries and Mariculture Laboratory

11:30 AM - **Comparing the mesophotic fish communities at North Hospital and Hospital Bank in the Northwestern Gulf of Mexico**
Linda Jordan* and David W. Hicks; University of Rio Grande Valley at Brownsville (*Student Presentation*)

11:45 AM - **The novel membrane androgen receptor ZIP9 regulates apoptosis of Atlantic croaker ovarian follicle cells**
Aubrey Converse* and Peter Thomas; The University of Texas Marine Science Institute (*Student Presentation*)

12:00 PM - **LUNCH (Catered by Aunt Sissy's Kitchen) in the Marine Science Education Center lobby.**

BAFFIN BAY (SPECIAL SESSION)

1:00 PM - **Everything is bigger in Texas: Saga of an eight year Brown Tide bloom in Baffin Bay**
Edward J. Buskey; University of Texas Marine Science Institute (*Invited Speaker*)

1:30 PM - **Historical Water Quality and Environmental Changes in Baffin Bay as Inferred from a Multiproxy Sediment Core Study**
[1]Mark Besonen*, [2]Philippe Tissot, [3]Paul Zimba, [1]Mark McKay, [3]I-Shuo Huang, [3]Erin Hill, and [1]James Silliman; [1]Dept. of Physical and Environmental Sciences (TAMUCC); [2]Conrad Blucher Institute (TAMUCC); [3]Center for Coastal Studies (TAMUCC)

1:45 PM - **Three years of water quality sampling in Baffin Bay by "citizen scientists": what have we learned?**
Michael Wetz*, Kenneth Hayes, and Emily Cira; Department of Life Sciences, Texas A&M University-Corpus Christi

Thursday, April 14, 2016 (continued)

2:00 PM - **A stable isotope study on organic matter driving oxygen consumption in two south Texas estuaries**
[1]Hongjie Wang*, [2]Kenneth Hayes, [2]Michael Wetz, and [1]Xinping Hu; [1]Department of Physical and Environmental Sciences, Texas A&M University – Corpus Christi; [2]Department of Life Sciences, Texas A&M University – Corpus Christi (*Student Presentation*)

2:15 PM - **Ecosystem-based Approach to Assess Black Drum in Baffin Bay**
[1]Jennifer Beseres Pollack*, [1]Greg Stunz, [2]Matt Ajemian, and [1]Kathryn Mendenhall; [1]Texas A&M University-Corpus Christi; [2]Florida Atlantic University Harbor Branch Oceanographic Institute

2:30 PM - **What factors contributed to the Black Drum emaciation event in Baffin Bay (2012-2013)?**
[1]Paul V. Zimba*, [1]I-Shuo Huang, and [2]Zachery Olsen; [1]Center for Coastal Studies, TAMUCC; [2]Texas Parks and Wildlife

2:45 PM - **Adaptations of a hypersaline resident: A case study of the upper Laguna Madre Black Drum (*Pogonias cromis*)**
Zachary Olsen*; Texas Parks and Wildlife Department- Coastal Fisheries Division

3:00 PM - **BREAK**

VERTEBRATE SCIENCE

3:15 PM - **Evaluating Whooping Crane Winter Territories using Home Range Estimators**
[1]Nicole Davis* and [2]Elizabeth Smith; [1]Texas State University – San Marcos – Aquatic Research Doctoral Program; [2] International Crane Foundation (*Student Presentation*)

3:30 PM - **Does elevated salinity induce a physiological response in Texas diamondback terrapin (*Malaclemys terrapin littoralis*)?**
Lindsey Ramirez*, Aaron Baxter, Paul V. Zimba, and Kim Withers; Center for Coastal Studies at Texas A&M University – Corpus Christi (*Student Presentation*)

3:45 PM - **Sea Turtle Nesting on Mustang and San Jose Island Gulf Beaches**
Anthony F. (Tony) Amos*; University of Texas Marine Science Institute

4:00 PM - **Movements of juvenile Kemp's ridley sea turtles (*Lepidochely kempii*) from estuarine waters of the northwestern Gulf of Mexico via satellite telemetry**
[1]Tasha L. Metz*, [1]Katie I. St. Clair, [2]Mandi L. Gordon; [1]Texas A&M University at Galveston Department of Marine Biology; [2]Environmental Institute of Houston, University of Houston – Clear Lake

Thursday, April 14, 2016 (continued)

VEGETATION

4:15 PM - **Changes in seagrass distribution and community composition using long-term monitoring along the Texas coast**
[1]Victoria M. Congdon*, [2]Sara S. Wilson, [1]Kenneth H. Dunton; [1] University of Texas Marine Science Institute; [2]Florida International University (*Student Presentation*)

4:30 PM - **Macroclimatic change expected to transform coastal wetland ecosystems this century**
[1]Christopher A. Gabler*, [2]Michael J. Osland, [2]James B. Grace, [2]Camille L. Stagg, [2]Richard H. Day, [2]Stephen B. Hartley, [2]Nicholas M. Enwright, [2]Andrew S. From, [3]Meagan L. McCoy, and [4]Jennie L. McLeod; [1]University of Texas Rio Grande Valley, School of Earth, Environmental and Marine Sciences, [2]U.S. Geological Survey, Wetland and Aquatic Research Center; [3]McCoy Consulting, U.S. Geological Survey, Wetland and Aquatic Research Center; [4]McLeod Consulting, U.S. Geological Survey, Wetland and Aquatic Research Center

4:45 PM - **2016 TBEM Closed**

Student Awards

Student presentations and posters are an important aspect of this meeting. The best student awards for presentations are one of the ways we have to acknowledge excellence in research. The best student oral presentation awards are generously sponsored by the Coastal Bend Bays & Estuaries Program to acknowledge excellence in research ($200 for 1st Place, $150 for 2nd Place and $100 for 3rd Place). The best student poster awards are generously sponsored by the Coastal Bend Bays Foundation to acknowledge excellence in research ($150 for 1st Place, $100 for 2nd Place and $50 for 3rd Place).

Previous Presentation Winners:

2011: **Rachel Mills**, The University of Texas Marine Science Institute, 1st Place
Kelly Darnell, The University of Texas Marine Science Institute, 2nd Place

2012: **Lisa Havel**, The University of Texas Marine Science Institute, 1st Place
Huy Vu, University of Houston, 2nd Place
Jena Campbell, The University of Texas Marine Science Institute, 3rd Place

2013: **Jud Curtis**, Texas A&M University-Corpus Christi, 1st Place
Kimberly Bittler, The University of Texas Marine Science Institute, 2nd Place
Brittany Bloomberg, Texas A&M University-Corpus Christi, 3rd Place

2014: **Philip Jose,** Texas A&M University-Corpus Christi, 1st Place
Rachel Arney, The University of Texas- Brownsville, 2nd Place
Quentin Hall, Texas A&M University-Corpus Christi, 3rd Place

2015: **Meredith Evans,** The University of Texas Marine Science Institute, 1st Place
Kathryn Mendenhall, Texas A&M University-Corpus Christi, 2nd Place
Juliet Lamb, Clemson University and Department of Forestry and Environmental Conservation, 3rd Place

Previous Poster Winners:

2013: **Xinxin Li**, Texas A&M University, 1st Place
Allan Jones, The University of Texas at Austin, 2nd Place
Aubrey Lashaway, The University of Texas Marine Science Institute, 3rd Place

2014: **Melissa McCutcheon,** Texas A&M University-Corpus Christi, 1st Place
Kevin DeSantiago, Texas A&M University-Corpus Christi, 2nd Place
John Mohan, The University of Texas Marine Science Institute, 3rd Place

2015: **Ashley Whitt,** Texas A&M University-Galveston, 1st Place
Jason Jenkins, The University of Texas Marine Science Institute, 2nd Place
Eric White, Texas A&M University-Corpus Christi, 3rd Place

COASTAL BEND BAYS & ESTUARIES PROGRAM

COASTAL BEND BAYS FOUNDATION
Dedicated to protecting our bays and estuaries

Abstracts for Oral Presentations

HABITATS AND ECOSYSTEMS

Evaluating Strategies for Meeting Seasonal Freshwater Inflow (FWI) Targets for the San Antonio Bay – Guadalupe Estuary System

[1]James Dodson* and [2]Joe Trungale; [1]San Antonio Bay Partnership; [2]Trungale Engineering & Science

A study was undertaken to evaluate potential water management strategies which could help meet seasonal FWI "Strategic Target Frequency" (STF) goals designed to provide a sound ecological environment in the San Antonio Bay – Guadalupe Estuary System. The study used the Guadalupe-San Antonio Water Availability Model (GSA WAM) to quantify, on an annual basis, the additional amount of stream flow necessary to supplement FWI's to San Antonio Bay in order to achieve spring and summer STF's. Baseline modeling determined that, in order to meet the long term attainment frequency goals specified by the BBEST, a supplemental supply of 90,000 acre-feet (ac-ft) of FWI annually would be needed to meet the spring STF target, and an additional 40,000 ac-ft of FWI annually would be needed to meet the summer STF goal. The study then used the GSA WAM and the Aquifer Water Balance Model -- developed for this project – to quantify the STF benefits of implementing two new FWI management strategies: legally dedicating wastewater return flows as "environmental flows," and allowing currently permitted non-consumptive water rights and new permits for currently unappropriated streamflow to be legally dedicated for environmental FWI's. The analysis also looked at how a system of Aquifer Storage and Recovery (ASR) facilities in the Gulf Coast Aquifer could "bank" dedicated stream flows, when available, for later supplementing of stream flows to achieve specific summer and spring FWI targets. The report recommends several changes in state water law and policy which would be key to implementing these potential FWI strategies.

The lability of suspended particles in northern Gulf of Mexico: Insights from pigments and amino acids in the water column and surface sediments

Jianhong Xue*, Chunyan Ren, Shuting Liu, and Zhanfei Liu; University of Texas at Austin, Marine Science Institute

Suspended particles were collected in water column and surface sediment in five cruises (May 2010-2013, and August 2010) along the Louisiana shelf in northern Gulf of Mexico (NGOMEX). Pigments and hydrolyzable amino acids were analyzed using high performance liquid chromatography (HPLC) to study the phytoplankton community structure and degradation status of suspended particles during spring and summer. Preliminary results show that surface total pigment (0-22 μg L^{-1}) on the inner shelf increased from west to east side, opposite to their salinity trend, and the total pigment decreased significantly on the mid-shelf (≤2 μg L^{-1}) and offshore (<0.5 μg L^{-1}). The phytoplankton community structure, derived from accessary pigments, was dominated by diatom in spring, and by both diatom and cyanobacteria in summer on the inner shelf. For chloropigments (i.e., Chl *a*, pheophytin, pheophorbide, and pyropheophorbide), samples from inner shelf contained higher pheophorbide percentages right above sediment-water interface than the water column samples or offshore spring samples, indicating more degradation through macrozooplankton grazing. Consistently, more pyropheophorbide and amino acids β-alanine & γ-aminobutyric acid were observed on the west inner shelf of 90°W in 2011 spring, indicating that organic matter was more degraded on the

west side. These results offer insights into phytoplankton dynamics, degradation status of suspended particles, and further formation mechanism of hypoxia during spring and summer in NGOMEX.

Identifying nesting habitat for Texas diamondback terrapin in the Nueces Estuary, TX
Aaron S. Baxter*; Center for Coastal Studies at Texas A&M University-Corpus Christi

Diamondback terrapins are North America's only brackish water species occurring in a narrow band of coastal habitats from Massachusetts to Texas. It is widely accepted that terrapin populations are declining throughout their range and the loss of nesting habitat is a contributor to this trend. This study sought to identify nesting habitat for Texas diamondback terrapin in the Nueces Estuary, Texas and to provide a habitat characterization to be applied throughout other Texas estuaries. Several methods were used to locate nesting beaches in the Nueces Estuary including the use of trail cameras, radio and acoustic telemetry, and walking surveys. All contributed to the eventual discovery of terrapin nesting sites. Results of this study showed that diamondback terrapins utilize elevated areas of vegetated shell hash as nesting sites in the Nueces Estuary. These areas exist as narrow bands of substrate sandwiched between the open bay and tidal marsh. All nests identified had been raided by predators. Because of the scarcity of this habitat type in the Nueces Estuary it is suggested that these areas first be protected from erosive wave action and then enhanced to provide larger areas of suitable nesting habitat. The creation of additional nesting sites could also provide more appropriate nesting habitat. Predator removal/relocation during the nesting season may also prove to increase nesting success for this species. It is also recommended that the nesting habitat characterization described in this report, be applied to other Texas estuaries to identify diamondback terrapin nesting sites throughout the state.

Black Mangrove Expansion into Southeast Texas Saltmarshes
Meredith Diskin* and Delbert L. Smee; Texas A&M University–Corpus Christi (*Student Presentation*)

Climate change is enabling the redistribution of foundation species, which may affect ecologically and economically important ecosystem functions and organisms that are associated with these environments. One evident example of this distribution shift occurs in the Gulf of Mexico where black mangroves are expanding into saltmarshes. While the climate mechanism facilitating black mangrove expansion is understood, less is known about the consequences for replacing salt marsh habitat with black mangroves. Salt marshes provide habitat to many important species, including blue crabs and brown shrimp. We conducted field sampling and manipulative experiments to help illuminate some of the unknown effects from this shift in vegetation species. First, we determined if there was a change in community structure as ecosystems shift from salt marsh to black mangrove forest by collecting nekton and benthic samples from each habitat. Secondly, using tethering experiments, we measured predation intensity in salt marshes and black mangroves. We found nekton abundances to be significantly higher in salt marsh than in the black mangrove ecosystems. Predation intensity was significantly higher in the black mangrove ecosystems and may account of community differences.

Salt marsh species interact with mangroves at experimental marsh-mangrove ecotonalgradient

[1]Sayantani Dastidar*, [1]Steven C. Pennings, [2]Anna R. Armitage, [1]Hongyu Guo, [1]Zoe Hughes, [3]Sean Charles, [3]John Kominoski, [2]Ashley Whitt, and [2]Carolyn A. Weaver; [1]University of Houston; [2]Texas A&M University at Galveston; [3]Florida International University, Miami (*Student Presentation*)

With the rise in global temperature, mangroves are expanding their range towards higher latitude, intruding into areas that were primarily salt marsh vegetation. This shift brings about a regime change where woody species are expanding into grassy and forb dominated habitat. We studied how the interaction between the woody mangroves and marsh species vary across the mangrove density gradient and drives plant community composition at the marsh-mangrove ecotone. In 2012, we manipulated mangrove density by thinning 10 experimental plots (24x42m) in Harbor Island, Port Aransas, TX, to create an ecotonal density variation of mangroves from 0-100%, with each plot representing a different density of mangrove. Within these plots, we transplanted most common marsh plants, namely *Batis maritima*, *Spartina alterniflora*, and *Sarcocornia sp*, measured them at regular intervals throughout the growing season, and harvested them at the conclusion of the experiment. To look at the interaction between the marsh species and mangrove, three treatments were used in this experiment, namely, in presence of pneumatophores (mangrove trees were absent from this treatment), in presence of mangroves, and bare ground (control). Our findings hint at positive interaction between marsh species and mangroves at lower-medium densities of mangroves. Pneumatophores by themselves did not compete with marsh plants. Also, the marsh plant species faced severe compeition from mangroves in the high mangrove density plots. In summary marsh-mangrove plant interaction showed an interesting dynamic, with both positive and negative interaction depending on the changes in density of the functional vegetation type in the wetland ecosystem.

Community Characterization of Algal Epiphytes of Seagrasses in Proximity to Coastal Wetlands

Melissa Fisher*, Lucas Martinez, Chelsea Miller, Whitney Roberson, and Kirk Cammarata; Texas A&M University-Corpus Christi, College of Science and Engineering, Department of Life Sciences (*Student Presentation*)

Defining community characteristics of seagrass beds in proximity to wetlands is vital to understanding their cooperation in the food webs critical to coastal regions. Seagrasses are colonized by complex and poorly understood biofilms of epiphytic algae, bacteria and invertebrates. Tidal fluctuations likely mediate a bidirectional exchange of nutrients and biota between seagrass systems and coastal wetlands. Microalgae present in both areas experience high consumption rates by wetland macroinvertebrates, providing food for the next trophic level of foragers. This study initiated a morphology-based inventory of algal epiphytes to calibrate identification/quantifications made by the other technologies. Higher than average rainfall in 2015 created hyposaline conditions in local bays and the resultant inflow of freshwater and nutrients is expected to impact both the presence and prevalence of different algal species. An understanding of epiphyte community dynamics will facilitate inferences about recent water quality history from technology-based species identifications. Stedman's Island in Redfish Bay, near Corpus Christi, Texas was chosen as a study site based on the availability of all 5 local seagrasses in close proximity to salt marshes. Seagrass specimens were imaged with both visible and fluorescence scanners to document epiphyte accumulation patterns as a more robust alternative to dry biomass measurements. Algal epiphytes were identified using taxonomic keys, and samples were collected for subsequent DNA

fingerprinting. We have tentatively identified 15 epiphyte taxa, finding abundant cyanobacteria and diatoms, a prevalence of red alga, but a deficiency of greens and browns. Notable differences were observed between the different seagrass host species.

Dermo disease dynamics in the eastern oysters *Crassostrea virginica* throughout the Aransas-Copano estuarine system in South Texas

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Perkinsosis, also known as Dermo, is caused by a protozoan parasite *Perkinsus marinus*, and is a major cause of mortality in eastern oysters (*Crassostrea virginica*). Oyster and parasite are used as bio-indicators to assess the health and freshwater resources of bays and estuaries along the eastern and gulf coasts of the United States. Increasing temperatures and salinities allows for greater prevalence and intensity of Dermo. Ray's Fluid Thioglycollate Medium (RFTM) Technique is a method used as a diagnostic tool to detect Dermo in oyster tissue. This technique allows for oyster tissue infected with Dermo to be ranked using the Mackin scale, with 0 being the lowest and 5 being the highest. This year-long study, starting in July 2014, employed this technique to monitor Dermo along a salinity gradient throughout the Aransas-Copano estuarine system near Rockport, Texas. Sampling was conducted on a quarterly basis, 10 market and 10 sub-market sized oysters were collected from 7 stations located throughout the system. In the summer of 2015, El Niño like conditions brought a large volume of freshwater into the system dropping salinity to an average of 10. Dermo prevalence and weighted prevalence corresponded with the reduced salinity levels, showing lower numbers as well. Differing Dermo characteristics along the site specific salinity gradient were not observed due to the abnormally wide range of salinity levels throughout the system.

Assessing the Public Attitudes and Preferences of the Mission-Aransas National Estuarine Research Reserve, Texas Using Social Valuation

[1]Mayra Lopez*, [1]David Yoskowitz, [2]Maria Dillard, [1]Michael Starek, [1]Victoria Ramenzoni; [1]Harte Research Institute for Gulf of Mexico Studies, Texas A&M University-Corpus Christi; [2]Hollings Marine Laboratory, National Centers for Coastal Ocean Science

Ecosystem services are the benefits provided by nature which enhance human well-being. These services can include food, storm protection, and clean water. Unfortunately, it is often difficult to value ecosystem services in a manner that conveys their importance to stakeholders. To inform the management practices undertaken by resource managers and policy-makers of the Mission-Aransas National Estuarine Research Reserve (MA-NERR), Texas, we utilized social valuation; a method of valuing ecosystem services which uses survey responses to map and rank ecosystem services. Surveys were conducted November through January of 2013 and June through July of 2014. Respondents were asked about observed bio-physical changes over time, their opinion of specific management goals, and the adequacy of public access. Respondents were also asked to pinpoint locations of highly valued services on an interactive map. To determine differences, respondents were categorized into four groups: summer, winter, local and non-local. Data were analyzed using ArcGIS and SolVES (Social Values for Ecosystem Services), a USGS application for the assessment of ecosystem services. Heat maps generated through SolVES identified the location of highly valued ecosystem services and determined that a positive correlation existed between those services and the distance to water, roads, and land use/land cover. An analysis of non-spatial survey responses found a significant difference between local and non-local respondents but no significant differences between summer and winter responses. Overall, this study provides useful information for

resource managers and policy-makers in terms of making ecosystem-based management decisions, as well as encouraging public participation in the decision-making process.

Texas Coastal Bend Regional Climate Change Vulnerability Assessment
Meagan Murdock* and Jorge Brenner; The Nature Conservancy-Texas Chapter

There is a growing acceptance by society of the evidence and impact of climate change. Communities that are built upon the idea of a static climate with expected weather patterns are coming to the realization that the status quo is changing and they may also need to prepare for change. This project assessed the past evidence of a changing climate in the Coastal Bend region of Texas and explored how climate change may continue to impact the area based on climate change models. First, key climate change stressors, such as rising air temperatures and sea level rise, were identified. Then these stressors were used to analyze the impacts future climate change may have on different sectors including wildlife and ecosystems, the economy, human health, critical infrastructure, and cultural resources. Since there are large uncertainties surrounding climate change and the impacts it may have on communities, a range of scenarios were chosen to represent best and worst case. The assessment aims to be informative to a broad audience on the potential impacts of climate change in the Coastal Bend area.

Gulf of Mexico Research Initiative Information and Data Cooperative (GRIIDC): Adventures in Large Scale Data Management
Lauren Showalter*, Sandra Ellis, and James Gibeaut; Harte Research Institute for Gulf of Mexico Studies at Texas A&M University-Corpus Christi

Following the 2010 Deepwater Horizon BP Oil Spill in the Gulf of Mexico, BP committed $500 million (USD) for a research program that investigates the impacts of oil, dispersed oil, and dispersant on the environment and to develop strategies for response to future disasters. This research program, the Gulf of Mexico Research Initiative (GoMRI), is mandated to make all the data produced available to the public. To fulfill this goal, GoMRI developed the Gulf of Mexico Research Initiative Information and Data Cooperative (GRIIDC). GRIIDC is the vehicle by which GoMRI is addressing the data and information needs of this large and varied community of more than 3,000 scientists. The mission of GRIIDC is to ensure a data and information legacy that promotes continual scientific discovery and public awareness of the Gulf of Mexico Ecosystem. As part of its effort to encourage data sharing among scientists interested in oil-spill related research in the Gulf of Mexico GRIIDC provides tools to researchers to facilitate all aspects of the data management process, from developing data management plans, to creating robust metadata records, to ensuring the data is made discoverable by the public. GRIIDC also provides a service to ensure that GoMRI funded publications have any associated data linked and available. This cradle to grave approach to data management has been extremely effective in developing data management practices that will ensure better data stewardship and preservation of all the data created in the GoMRI research program.

HABITAT RESTORATION AND STEWARDSHIP

Marine Debris in the Gulf: types, impacts and NOAA's reduction efforts
Kim Albins; NOAA Marine Debris Program (*Invited Speaker*)

Marine debris is an economic, environmental, and human health problem that poses a significant and complex challenge across the world. Marine debris ranges in size from microplastics to large abandoned and derelict vessels. The Gulf of Mexico is not immune to these challenges. Habitats and wildlife along with local communities across the Gulf are affected by marine debris. NOAA's Marine Debris Program was developed in 2006 to address the issue of marine debris across the US. We are working across the Gulf to have a better understanding of the impacts of marine debris through research. In addition, our program coordinates entities across the Gulf States to create strategic plans to reduce marine debris. We also are actively working through our Federal Funding Opportunities to remove marine debris and prevent the occurrence of marine debris through outreach and education. During this presentation I will give specific examples of marine debris research, removal, and prevention projects that are occurring across the Gulf of Mexico region.

Plastic Marine Debris in the Coastal Bend
Neil McQueen; Surfrider Foundation – Texas Coastal Bend Chapter, Skip the Plastic Project

While many people are aware of the North Pacific Garbage Patch, few realize that the Coastal Bend faces its own plastic marine debris problem. A 2014 study estimated that 5.25 trillion pieces of plastic, large and small, weighing 269,000 tons, could be found in the world's oceans, while a 2015 University of Georgia study calculated that 8 million tons of plastic trash originating within 30 miles of the coast entered the world's oceans in 2010. Shorebirds, turtles, dolphins and other marine animals often ingest plastic or become entangled in discarded plastic shopping bags and monofilament fishing line, causing severe wounds, starvation and a slow death. Once discarded, disposable plastic items don't biodegrade. Instead, the sun slowly breaks them down into smaller pieces, allowing the pieces to be dispersed widely in watery habitats. Littered plastic bags and Styrofoam containers that aren't blown into trees or fences often accumulate in the storm drains until a rain event flushes them into natural waterways. The complex system of municipal storm drain systems and Texas rivers transport much of the plastic trash in runoff from inland cities to the coast. Area beaches are the top attraction for tourists. Those tourists will go elsewhere if the Coastal Bend gains a reputation for trashy beaches, wetlands and bays. Plastic pollution can be prevented through: 1) Increased public awareness through education and advertising campaigns; 2) Signs and cigarette butt receptacles; 3) Anti-litter enforcement; 4) A statewide deposit/refund program for beverage containers

Controlling Brazilian Peppertree: Management and Outreach Efforts of the Texas Gulf Region Cooperative Weed Management Area (CWMA)
[1]Beau Hardegree*, [2]Mike Murphrey, [3]Katie Swanson, and [4]Hans Landel; [1]U.S. Fish and Wildlife Service; [2]Texas A&M Forest Service; [3]Mission-Aransas NERR/University of Texas Marine Science Institute; [4]Lady Bird Johnson Wildflower Center

The Texas Gulf Region Cooperative Weed Management Area (CWMA) was established in 2014 to control Brazilian peppertree (*Schinus terebinthifolius*) on barrier islands from Packery Channel to Port O'Connor, Texas. CWMA formation, control and outreach efforts, as well as

lessons learned over the last two years will be discussed. Outreach and control activities have been directed primarily within the City of Port Aransas, and other areas of Mustang Island. Through door-to-door outreach, social media, traditional media and workshops, approximately 3,000 landowners adjacent to public lands have learned about the negative impacts of Brazilian peppertrees. Brazilian peppertree has been removed from over 120 acres, and over 5,000 acres are now under improved land management as a direct result of CWMA activities. CWMA steering committee members include state and federal agencies, local governments, universities, and non-governmental organizations.

Habitat Restoration and Enhancement of Barrier Island Woodlands in Nueces County

[1]Scott Cross*, [2]Mary Ellen Vega, and [2]Mary Kay Skoruppa; [1]Nueces County Coastal Parks; [2]Naismith Engineering, Inc.

Packery Channel Nature Preserve Park (Park) is located on northern Padre Island, Nueces County. The Park is immediately adjacent to an area known as "Packery Woodlands", the only live oak-red bay woodlands on Padre and Mustang islands. This unique barrier island feature is heavily used as stopover habitat and as a fallout site for Neotropical migratory birds during the spring and fall migration periods. Because of the importance to migratory birds and the popularity of this area among birders, the park was designated as a Nature Preserve and is an official site on the Great Texas Coastal Birding Trail. Through a 2011 Coastal Impact Assistance Program grant, a restoration and enhancement project was conducted using native landscaping to maximize food resource availability for birds. The design includes six different woodland habitats composed of native trees, shrubs, forbs, and vines which provide a wide range of cover and food for migrating birds. The six woodland habitat types (Live Oak Woodland, Moist Soil Woodland, Palm Grove Woodland, Tamaulipan Thorn Scrub Woodland, Coastal Woodland A, and Coastal Woodland B) are represented by 13 "planting units" placed within a 2-acre project site. A total of 2,360 native plants representing 43 species were planted. Three bird drip stations were installed at the project site and invasive plants (primarily Brazilian peppertree and guineagrass) were removed from the entire 38-acre park property. A 380-foot long boardwalk was constructed within the project site to safely accommodate visitors for viewing the native woodland habitats, wetlands, birds, and other natural features.

Predicting and Responding to Petroleum Pollution in Coastal Salt Marshes

[1]Meredith Evans*, [1]Jiqing Liu, [2]Brad E. Rosenheim, and [1]Zhanfei Liu; [1]The University of Texas at Austin, Marine Science Institute; [2]The University of South Florida (*Student Presentation*)

Petroleum is simultaneously one of the greatest resources and greatest threats found in the Gulf of Mexico. With thousands of natural oil seeps and offshore oilrigs, natural and accidental oil spills commonly pollute the coastline. In order to effectively respond to this pollution, an accurate understanding of the chemical nature of petroleum and how it changes in marine environments is required. Here, we use the 2010 *Deepwater Horizon* oil spill as a case study to describe petroleum weathering (i.e. chemical transformation over time) in coastal salt marshes. Samples of oil sheen, oiled sediment and tar were collected on Grand Isle and within Barataria Bay, Louisiana from 2010-2012. Petroleum hydrocarbons, including *n*-alkanes, polycyclic aromatic hydrocarbons (PAHs) and alkylated PAHs were quantified using gas chromatography analysis. By comparison to crude oil, we observe overall depletion of measured hydrocarbons >80% within one year of the spill. On a compound-specific level, however, we observe complete retention of some toxic PAHs, which gives practical insight into specific toxicity threats. We also highlight weathering patterns based on geography, whereby low energy environments and fine grain-size sediments have lower depletion of petroleum hydrocarbons over time. Using this information, we suggest practical approaches for petroleum pollution

response including how to practically collect samples, streamline petroleum compound analysis and prioritize restoration based on environmental characteristics. This is useful for scientists interested in studying chemical pollutant evolution, as well as responders looking to effectively evaluate and prioritize pollution threats in Texas bays and estuaries.

WATER QUALITY

Degradation of WAF, CEWAF, and DCEWAF in biologically enriched mesocosms

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Shortly after the Deep Water Horizon (DWH) oil spill, profuse marine snow was observed on the surface water near the site, and quickly sank to the bottom suggesting a link between marine snow, the bacterial loop, and oil. Marine snow is defined as dense macroscopic aggregates of any type of particle larger than 5 μm. The aggregates are glued together by microbe-produced exopolymeric substances (EPS). An oil spill like DWH likely triggered an overproduction of EPS, which in consequence would stick to surrounding droplets of oil and remove them from the system. The ADDOMEx consortium, funded by GOMRI, is attempting to understand the role of EPS in the degradation of oil and COREXIT 9500. This particular study focuses on employing mesocosms to understand the role of phytoplankton and bacteria in the production of neutrally and positively buoyant particles in the presence of petroleum and dispersants. As part of these studies, previously generated water accommodated oil fraction (WAF), COREXIT plus WAF (CEWAF), and diluted CEWAF mesocosms were tested in triplicate. Each tank was filled with 79 L sea water and 2 L concentrated plankton collected from the Gulf of Mexico. Total Scanning Fluorescence (TSF) and GC/MS analysis were used to estimate the petroleum concentration and composition at the beginning, during, and at the end of the experiments. Results show EPS formation within 24 h of the addition of the plankton concentrate followed by a rapid decrease of the estimated oil equivalence (EOE) in the first 10 h of the experiment.

Influence of consecutive major storm events on source of particulate organic matter in a subtropical estuary, Texas

Nicolas Reyna*, Amber Hardison, and Zhanfei Liu; Marine Science Institute, University of Texas at Austin (*Student Presentation*)

The Mission-Aransas Estuary in subtropical Texas is characterized by semiarid climate, drought, and sporadic precipitation events that affect the water quality of the system. Changes in the inflow regime in turn alter the source and composition of the particulate organic matter (POM). To evaluate the impact of freshwater discharge on POM source, monthly samples of surface water were collected at four long-term monitoring stations from 2012-2016 and analyzed for carbon and nitrogen concentrations and stable isotope content and pigment concentrations. Following a prolonged dry spell, consecutive major storm events in spring 2015 ended the drought and led to a dramatic freshening of the entire estuary. An increase in particulate organic carbon (POC) concentration and a depletion in the δ^{13}C-POC suggest a shift from marine to terrestrial organic matter as a result of increased freshwater inflow. These

trends in bulk POM coincided with an increase in chl *a* concentration, indicating a significant contribution by phytoplankton to the elevated POM. Concurrently, pigment biomarkers revealed a significant (400-fold) increase in zeaxanthin concentration, the cyanobacterial biomarker, implying that this class of phytoplankton was responsible for the observed bloom. The cyanobacteria likely came from riverine input, as it occurred in the estuary at salinities below 8. These results show episodic rain events can substantially change the sources of POM in the system and may have ecosystem-wide implications on productivity.

Long-term trends and spatial variability of pCO2 in the Texas estuaries
Melissa McCutcheon* and Xinping Hu; Texas A&M University-Corpus Christi (*Student Presentation*)

Rising atmospheric CO2 and the dependency of air-sea CO2 flux on pCO2 are increasing the attention directed towards estuarine pCO2 studies, but there remains much uncertainty in the contribution of estuarine systems to the global carbon budget, as a limited number of studies skew toward temperate to high latitude estuaries. Many estuaries have a pCO2 exceeding atmospheric levels by an order of magnitude, and therefore, act as a substantial source of CO2 to the atmosphere. Net community metabolism and the resulting respired CO2 exert the primary control on estuarine pCO2, and this metabolism is largely controlled by physical factors such as temperature and residence time. This study aimed to address pCO2 distribution and long-term trends in the Texas coastal bays, many of which receive freshwater with substantially higher buffer capacity than those in the literature. pCO2 in 32 separate coastal bays was calculated from historical alkalinity and pH data collected by the Texas Commission on Environmental Quality. There was substantial variability in pCO2 between and within bays. pCO2 generally decreased from northeast to southwest along the Texas coast, likely due to the large latitudinal extent and resulting climatic gradient characterized by decreasing rainfall and riverine inflow from north to south. Several bays had significant long-term trends in pCO2, but there was no overarching pattern of increase or decrease through the entire coast.

Alkalinity Dynamics in Groundwater Affected Secondary Bay in South Texas
Melissa Trevino*, Dorina Murgulet, Xinping Hu, Audrey Douglas, and Nicholas Spalt; Texas A&M University-Corpus Christi (*Student Presentation*)

Atmospheric CO_2 increase has raised global concerns over oceanic and estuarine acidification. A better understanding of the natural ability of estuaries to buffer decreasing pH levels is warranted. This study investigates the total alkalinity (TA) in Nueces Bay (a secondary bay adjacent to Corpus Christi Bay in the Gulf of Mexico), at scales spanning from hours to seasonal, by incorporating submarine groundwater discharge (SGD) rates determined using continuous Radon (Rn) measurements and electrical resistivity methods. Seasonal TA fluxes within the bay were mostly affected by discharge from Nueces River, while SGD impacted the TA in the river. TA values were the highest in the river (~ 4,040 µmol/L), and steadily decreased from the river mouth to Corpus Christi Bay (~ 2,223 µmol/L). Frequent SGD occurrences ranging from 2.85 to 46.51 cm/day are noted along the north shore, close to the Nueces River mouth, and in the middle of the bay were observed for four quarterly sampling events. SGD rates up to 73 cm/day were measured within Nueces River, near the discharge point of the river. Following flooding events from spring to summer 2015, instances of negative SGD (i.e. groundwater recharge) were identified along the north shore (July-2015:-8.6 cm/day) and mid-bay (September-2015:-4.02 cm/day). Correlation analyses of single event measurements of SGD and TA indicate during positive SGD (i.e. groundwater discharge), TA values decreased in both river and bay waters. Post flooding however, an increase of TA was observed in the bay where SGD rates were negative, likely due to evaporation.

Spatial variability in hydrologic surface connectivity between a coastal river and its floodplain

Cesar R Castillo*, İnci Güneralp, Billy Hales, Burak Güneralp; Department of Geography, Texas A&M University (*Student Presentation*)

Significant in the transport and dispersal of energy, matter, and biota within riverine environments, hydrologic connectivity has become fundamental in understanding river-floodplain process and concepts associated with environmental flows. Hydrologic surface connectivity between a river and its floodplain is dependent on floodplain geomorphology, channel hydraulics, and land cover. In this study, we examine the floodplain morphology of the Mission River on the Coastal Bend of Texas. To assess the dominant flow directions, and thus, characterize the connectivity within the floodplain, we determine hydrological facets—landscape patches with their own respective outlet and high internal surface water connectivity. Guided by streamflow records, we systematically threshold the RDEM to determine the spatial characteristics of floodplain inundation under various river-stages. The increasing aerial extent of floodplain inundation from increases in river-stage results in distinct patterns of river channel–floodplain connectivity. We analyze the spatial arrangement of facets with regard to inundation in order to quantify floodplain connectivity and associated attributes at various river-stages using graph theory. Our results indicate that river-floodplain connectivity and its attributes change nonlinearly with increases in river-stage; with the greatest increases in connectivity occurring well below bankfull conditions. This is significant because river-floodplain connectivity is an important factor in the distribution of riparian vegetation and food-web dynamics within lowland riverine environments. Floodplains provide valuable ecosystem services, but their hydro-geomorphic properties are rarely considered in environmental flow policies. This study improves our understanding of river-floodplain interactions that can be used to inform management of these vital resources.

The role of submarine groundwater discharge (SGD) as a pathway for nutrient discharge to Nueces Bay, Texas

Audrey Douglas*, Dorina Murgulet, Nicholas Spalt, and Melisa Trevino; Texas A&M University-Corpus Christi, Department of Physical and Environmental Sciences (*Student Presentation*)

This study evaluates the role of SGD (an important pathway for material transport to the sea) derived nutrient fluxes to the nutrient budget and health of ecologically unsound semi-arid estuaries such as the Nueces Bay, Texas. Electrical resistivity profiles revealed numerous anomalies that correspond spatially with oil/gas wells or pipelines, anthropogenic disturbances to the bottom sediment that likely create SGD conduits. Geochemical radionuclide groundwater tracers such as radon and radium indicate frequent SGD occurrences along the north shore (24.14 to 26.23 cm/day), close to the Nueces River mouth (13.62 to 46.51 cm/day), and in the middle of the bay (2.85 to 38.16 cm/day) with occasional instances of potential surface water recharge to the groundwater along the north shore in July 2015 (-8.6 cm/day) and mid-bay in September 2015 (-4.02 cm/day). The lowest bay-wide mean SGD rates occurred in July 2015 (2.62 cm/day) following greater than normal precipitation and flooding due to El Niño that lead to a rapid flushing of the bay and a drop in salinity from ~32psu to <5psu. The bay-wide mean SGD rates had partially recovered to pre-flood rates (32.83 to 36.87 cm/day) by September 2015 (18.81 cm/day). Overall, nutrient levels are largest at the river and decrease with distance towards Corpus Christi Bay. Ammonium and phosphate are consistently more elevated in porewater while in surface water vary significantly by season. The elevated June/July-2015 phosphate levels are likely due to flood conditions whereas the most elevated April-2015 ammonium levels are associated with SGD from anoxic flowpaths.

Postulating Hydrodynamic and Geochemical Processes Associated with Nutrient Delivery in Copano Bay, Texas
Nicholas Spalt*, Dorina Murgulet, Audrey Douglas, and Melisa Trevino; Texas A&M University-Corpus Christi (*Student Presentation*)

Oyster reefs have been identified as providing key ecosystem services to the Texas Coastal Bend. Understanding the hydrodynamics linked to subsurface biogeochemical processes in these areas is critical as they stimulate remineralization and primary production. Knowledge of hydrogeologic interactions will allow policy makers to generate informed decisions on where to focus reef restoration efforts or designate protected areas. This study was rooted in identifying the sources and hydrologic processes driving the constituents that create biogeochemical hotspots in a reef-dominated estuary. Continuous Resistivity Profiling (CRP) complimented by existing chirp seismic profiling in the area of Copano Reef reveal changes in lithology that are argued to be linked to preferential groundwater flowpaths elsewhere. Sampling locations for bottom water geochemistry (Radon, DIC, pH, total alkalinity, salinity, temperature, and chlorophyll-α) were selected based on different geomorphology in proximity to the reef. Spatial analysis of salinity and radon (a groundwater tracer) suggest diffuse meteoric submarine groundwater discharge (SGD) in the area of the reef and back-reef (interfluve) compared to the paleovalley. Time-series measurements of subsurface bulk resistivity were used as a proxy to calculate pore water salinity variation. The highest exhibited change in bulk resistivity occurred at the oyster reef (~40%). While it is difficult to distinguish between surface water recirculation and meteoric SGD at this time, preliminary evidence argues that the reef, and interfluve with increasing distance to shore, facilitate the transport of fluids that could carry limiting nutrients.

Mysterious Alkalinity Loss During a Drought Year (2014) in the Mission-Aransas Estuary
Xinping Hu*, Hongming Yao, and Cory Staryk; Department of Physical and Environmental Sciences, Texas A&M University – Corpus Christi

Oceanic and estuarine alkalinity typically exhibits a conservative behavior along examined salinity gradients. However, such conservative behavior would break down in areas subject to prolonged water residence time, such as tropical carbonate banks and semi-arid estuaries. One explanation for such depletion was that benthic calcareous organisms consume alkalinity while synthesizing their shells or skeleton. Using bi-weekly water chemistry data collected in the Mission-Aransas Estuary in 2014 when this area was subject to severe drought, we also observed significant alkalinity decline. Mass balance calculations using titration alkalinity, calcium ion concentration, and salinity suggested that as much as ~80% of alkalinity consumption was not due to calcification. Rather, an external acid source was likely the leading cause of alkalinity depletion.

INVERTEBRATE ECOLOGY

Oyster culture potential in Texas bays and estuaries
John Scarpa* and Joe Fox; Department of Life Sciences, Texas A&M University – Corpus Christi

Eastern oyster (*Crassostrea virginica*) populations along the Gulf of Mexico coast, have historically been affected by extreme weather events (e.g., hurricanes), salinity extremes from prolonged drought or excessive rainfall, and human-induced stresses (e.g., Deepwater Horizon

oil disaster) that have, at times, dramatically reduced oyster landings resulting in millions of dollars in economic loss. Even so, Gulf of Mexico oyster landings accounted for about 43% of total U.S. landings in 2013. However, increased consumer demand has led to the importation of over 24 million lbs of oysters from foreign sources. At present, Texas oyster harvesters typically cannot reach daily bag limits. Stagnant or declining oyster landings in the U.S. has resulted in increased interest in aquaculture on the part of producers. Currently, aquaculture accounts for ~96% of all oysters produced globally. Aquacultured oysters provide similar ecosystem services as natural oysters and the aquaculturists themselves become environmentalists because poor water quality affects their product and sales. The Texas oyster fishery produces annually an average of 5 million lbs of oyster meat, but with substantial variation: 2.7 to 6.8 million lbs over the past 20 years. Texas has no policy for commercial oyster aquaculture, but TPWD recently initiated discussions for a Texas Oyster Aquaculture Plan. The addition of oyster aquaculture to Texas waterways would provide hard economic value through increased seafood supply and associated service businesses, thus improving economic resilience of coastal communities. This presentation will review the Texas oyster fishery and the potential for oyster aquaculture in Texas bays and estuaries.

Reproductive costs of an induced morphological defense in the Eastern oyster *Crassostrea virginica*

[1]Avery E. Scherer*, [1,2]Christopher E. Bird, and [1]Delbert L. Smee; [1]Texas A&M-University Corpus Christi; [2]Hawai'i Institute of Marine Biology, University of Hawai'i (*Student Presentation*)

To reduce predation risk, many prey species will alter their behavior or morphology in situations where risk of injury or death is imminent. Responding to predators often incurs costs, such as reductions in growth or fecundity, but how these costs affect organisms long-term has rarely been investigated. Oysters grow heavier, stronger shells in the presence of predators. It is assumed such changes increase energy allocation to shell production and reduce allocation to the production of soft and gonadal tissue, potentially producing long-term effects on oyster populations and oyster reef health. We investigated the relationship between shell and soft tissue production in oysters, including gonad tissue. We characterized oyster shell morphology and collected somatic and gonadal tissue weights for oysters collected from local reefs. Regression analysis was used to build models of somatic and gonadal tissue indices using shell thickness and density. Preliminary results suggest shell density and thickness influence somatic and gonad tissue production. Results from this study will be valuable to investigate the relationship between shell and soft tissue in oysters and in guiding future studies to investigate this relationship under conditions of predation risk.

Oyster and Dermo Response to Salinity: Implications for Freshwater Inflow Standards

Daniel Opdyke*, Deborah Chiavelli, and Elaine Darby; Anchor QEA

Oysters are a seminal species throughout much of the Texas coast; oysters support a robust commercial fishery and oyster reefs provide numerous ecosystem services. Oysters are tolerant of wide ranges in salinity, however, extended periods of low or high salinity are known to be stressful, or even fatal, to oysters. These observations have implications for water rights permitting decisions and the Senate Bill 3 environmental flows process. As more freshwater is diverted and used upstream, higher salinity conditions can be expected in estuaries. Knowledge of the tolerance of oysters for differing salinity conditions can be used to inform freshwater inflow standards. In this study, funded by the Texas Water Development Board, a long period of record for oyster count per dredge tow and dermo (an oyster parasite) data in Matagorda and Lavaca Bays was compared against salinity and temperature data to evaluate existing standards. The results indicate a strong dependence of dermo on the frequency of

large freshening events (<2 ppt; more events result in less dermo), recent temperature (lower temperatures result in less dermo), and average salinity conditions (lower salinity results in less dermo); the selected multiple linear regression model explained 66% of the variance in the dermo data, across hundreds of samples from ten reefs over approximately ten years. Results for oyster counts were also determined, with an average salinity of 20 ppt and freshening events spaced 18 months apart providing optimal conditions. These results generally corroborate the standards, but highlight the need for protecting large inflow events.

Wave energy reduces the abundance and size of benthic species on oyster reefs

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Hydrodynamic forces affect community composition, structure and function in rocky intertidal communities, yet the effects of waves on many other communities remain relatively unexplored. We investigated the effects of waves (wave height, wave period, and flow velocity) on biodiversity and species size within the Mission-Aransas National Estuarine Research Reserve near Rockport, TX, USA. The refuge holds extensive oyster reef systems that experience unique flow environments. An oyster reef bordering two bay systems (Aransas Bay and St. Charles Bay) is subject to significantly different wave regimes across each side of the reef. The Aransas Bay (windward) side is associated with significantly higher wave heights and velocities than the St. Charles Bay (leeward) side. Species richness and abundances were greatest on the leeward sides. Crabs were the most abundant organisms collected, and were significantly larger when protected from wave action on the leeward side of oyster reefs. Barnacles were significantly larger on the windward side, yet exhibited smaller scaled cirral dimensions in comparison to leeward barnacles, indicative of higher wave forces and flow velocity in the windward area. Thus, hydrodynamic forces can influence biodiversity and morphology of oyster reef fauna.

Predator boreholes in shells of the bivalve *Periploma margaritaceum* in Corpus Christi, Texas

Fabio Moretzsohn; Department of Life Sciences, Texas A&M University-Corpus Christi

The unequal spoonclam, *Periploma margaritaceum*, is a bivalve mollusk found in shallow water along the Texas coast. It is one of the most common species found in beach drift around Corpus Christi. Despite its abundance, this species is often overlooked and its ecology is poorly known. Like other species in the Periplomatidae and related families, this bivalve is inequivalve and reported to lie on one valve while buried shallowly in the sediment. Shells with round boreholes, typical of those made by predatory Naticidae (moon snails), are common. Studies show a higher incidence of boreholes on the right valve, suggesting the bivalve lies with the right valve uppermost. Boring site is strongly selected for the anterior slope of the shell, indicating predator preference for borehole location. A study of shells from the Corpus Christi region corroborated those findings, with some differences. This bivalve has a fragile shell, and boreholes may affect the mechanical integrity of the valves, however, presence of boreholes alone does not explain the strong differential valve sorting observed in beach drift, where an average 4.2-fold bias toward the right valves has been documented. There are also differences in shell shape, mechanical strength, and borehole incidence between shells from Gulf beaches in comparison to bay beaches, which suggest higher predation (by almost 3-fold) by naticids on Gulf specimens. A discussion on boreholes and differential valve strength will be presented.

FISH AND FISHERIES

Quantitative relationships between sound production and abundance in estuarine spawning aggregations

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Effective management of fish populations requires accurate measurements of density to estimate fish abundance and biomass. Fisheries-independent surveys utilizing active acoustics (echosounders) can provide accurate estimates for fishes that form spawning aggregations (FSAs), but this method has not been applied to coastal estuaries and is often hindered by the cost and complexity of data collection and processing. The broad occurrence of sound production in fishes that form FSAs in estuaries provides an opportunity to use passive-acoustic methods to estimate fish abundances from measurements of sound levels in a more cost-effective and efficient manner; however, difficulties in correlating sound production with fish density have prevented the widespread use of this approach. In this study, we compared Gulf Corvina (*Cynoscion othonopterus*) sound levels with measurements of density from active-acoustic surveys. We found that the relationship between measurements was variable across the duration of surveys but stabilized during the timing of spawning, resulting in an equation to estimate density directly from sound level measurements. Our results confirm that active-acoustic methods provide robust, independent measurements of density, abundance, biomass, and spatial distribution of fish at FSAs in shallow estuaries. They also indicate that sound levels can be used to determine fish density and distributions, which may be used to estimate the abundance and biomass of fishes at FSAs. When scaled appropriately, our approach is broadly applicable to other soniferous fishes that form FSAs in estuaries, representing a cost-effective and efficient method to assess fish populations and associated fisheries in these complex habitats.

Aggregation Bias in Time Series Data

Mark R. Fisher; Texas Parks and Wildlife Department, Coastal Fisheries

Time series data typically need to be aggregated into regularly spaced intervals, e.g., daily, weekly, monthly or higher before they can be used as input into time series models for analysis. However, the degree of aggregation can have profound effects on parameter estimation and on the lag structure and correlation with other variables. I will demonstrate this effect with bag seine and trawl survey catch-per-unit-effort of brown shrimp in the Mission-Aransas estuary, conducted routinely by the Texas Parks and Wildlife since 1982. At lower levels of aggregation, these surveys are highly correlated with each other with the bag seine data serving as a leading indicator for the trawl survey. At higher levels of aggregation, the bag seine survey is no longer a leading indicator, and when aggregated at an annual level, the correlation between the two surveys becomes non-significant. Caution is advised when working with aggregated data, as results can be distorted with respect to lag structure and correlation, and can lead to serious consequences in inference and decision-making.

Diet analysis of Red Snapper, *Lutjanus campechanus*, on natural and artificial reefs in the western Gulf of Mexico

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Energy exploration in the Gulf of Mexico (Gulf) has resulted in the addition of numerous oil and gas production platforms that have added structurally complex habitat to an area otherwise comprised of primarily bare bottom. The impact of these artificial structures on fish populations is largely unknown and there is ongoing debate about their functionality. Red Snapper (*Lutjanus campechanus)* is an ecologically and economically important sportfish that uses natural reefs as well as the artificial reefs created by standing and reefed (toppled or cutoff) oil and gas platforms. The influence of habitat on Red Snapper feeding habits is unresolved in the Gulf, particularly whether diets differ between natural and artificial reefs. Most available data on Red Snapper feeding habits is from Alabama and Louisiana in the northern Gulf with very little data investigating the influence of habitat type on feeding habits. Red Snapper (155-855 mm TL) were collected from standing rigs, reefed rigs, and natural hard-bottom in the western Gulf. Physical parameters (sex, total weight, TL) were recorded and stomachs were preserved in formalin. Stomach contents were sorted, identified to the lowest possible taxon, counted, and wet weight was measured for each prey item. Ongoing analysis will identify what Red Snapper in the Western Gulf are feeding on and what differences, if any, exist between the diets of Red Snapper on artificial and natural reefs in the Western Gulf of Mexico.

Ontogeny of digestive enzyme activity of pigfish (*Orthopristis chrysoptera*)

Kathryn Thompson*, Cynthia K. Faulk, and Lee A. Fuiman; The University of Texas at Austin Marine Science Institute, Fisheries and Mariculture Laboratory

Pigfish (*Orthopristis chrysoptera*) is a popular baitfish and potential candidate for commercial aquaculture production, which depends on the ability of the larvae to be reared efficiently. Currently, fish are fed live prey throughout the larval stage, which is expensive and very labor intensive. Determination of when the larvae can be efficiently switched to a dry diet is necessary to alleviate these costs, and provide the fish with a more nutritional diet. In this study, the digestive ability of pigfish larvae was assessed by determining the activity of selected pancreatic enzymes: amylase, bile salt-dependent lipase, chymotrypsin and trypsin which hydrolyze carbohydrates, lipids, and proteins, respectively. Pancreatic enzyme activity (measured as U larva^{-1}) was low at hatching until a substantial increase occurred at 8.5 mm standard length (SL) for amylase (0.07-58 U larva^{-1}), 5.6 mm for bile salt-dependent lipase (5.2-1250 U larva^{-1}), 6.1 mm for chymotrypsin (0-3400 U larva^{-1}), and 6.9 mm for trypsin (0.1-220 U larva^{-1}). Acid protease, which hydrolyzes proteins, was also quantified because it indicates a formed, functional stomach. Activity was detected at first sampling (25 days post-hatching (dph)) and remained at a base level of 50 U larva^{-1} until reaching 10.9 mm SL, after which activity increased sharply. The appearance of these enzymes suggests pigfish larvae can be effectively weaned to a complex dry diet at approximately 11 mm standard length, which corresponds to 30 dph when reared at 24 °C.

Comparing the mesophotic fish communities at North Hospital and Hospital Bank in the Northwestern Gulf of Mexico

Linda Jordan* and David W. Hicks; University of Rio Grande Valley at Brownsville (*Student Presentation*)

Mesophotic coral ecosystems (MCEs) are found at intermediate depths of the photic zone between 30-150m. The South Texas Banks are a MCE consisting of at least 14 major structures that are the remnants of a relict coral reef paralleling the South Texas shoreline. This reef was extant during the late Pleistocene and now extends from Matagorda Bay south to the Rio Grande off the South Texas coastline between the 60 to 80 m contours. Understanding the community structure, biodiversity and, geographic connectivity of the South Texas Banks is essential with increasing threats from climate change, ocean acidification, and invasive species. In this study, a ROV was used to examine the fish communities at two of the South Texas Banks: North Hospital and Hospital banks. Reef fish were identified to the lowest possible taxon and enumerated from ROV transect video footage. A total of 852 demersal and pelagic fishes were recorded representing 40 species in 20 families including invasive *Pterois volitans*. The reef fish communities were 97.5% dissimilar. North Hospital Bank had a higher species richness (S=38) compared to Hospital (S=18). The three most common species at Hospital Bank were *Lutjanus campechanus* (32%), members of the family Gobiidae (23.6%), and *Lutjanus griseus* (7%). The three most common species at North Hospital Bank were *Chromis insolata* (46.6%), *Chaetodon sedentarius* (7.4%), and *L. campechanus* (7%). MaxEnt was used to create species distribution models for *C. insolata* and Lutjanids, which indicated that North Hospital had more suitable habitat for these species than Hospital.

The novel membrane androgen receptor ZIP9 regulates apoptosis of Atlantic croaker ovarian follicle cells

Aubrey Converse* and Peter Thomas; The University of Texas Marine Science Institute (*Student Presentation*)

Ovarian follicles consist of the developing oocyte surrounded by layers of steroid-producing follicle cells. The breakdown of ovarian follicles is a normal process that occurs through apoptosis (programmed cell death) and is essential for maintaining ovarian function. Follicle breakdown can occur through atresia, which involves the breakdown of the oocyte and surrounding follicle cell layers when a maturing follicle fails to ovulate. In addition, postovulatory follicle breakdown occurs in the retained follicle cells after oocyte ovulation. This ovarian remodeling is especially pronounced in lower vertebrates such as broadcast spawning marine fish which can release 100,000's of oocytes over a relatively short period of time. Androgens have been shown to induce apoptosis of ovarian follicle cells in a number of vertebrate models, but the mechanism guiding this action is still speculative. Recently, a novel membrane androgen receptor, ZIP9, was found to be highly expressed in Atlantic croaker ovary. In addition, ZIP9 was found to mediate androgen-induced cell death in croaker ovarian follicle cells. Using an Atlantic croaker primary follicle cell culture system, we characterized this apoptotic response, the signaling pathways which initiate it, and the potential for environmental contaminants to disrupt the response. Examination of testosterone's activation of ZIP9 in ovarian follicle cells indicated that the receptor mediates a unique signaling pathway which is dependent on the presence of extracellular zinc and can be disrupted by environmental contaminants. These findings support a role for ZIP9 in androgen-mediated atresia and postovulatory follicle breakdown in these marine fish.

BAFFIN BAY (SPECIAL SESSION)

Everything is bigger in Texas: Saga of an eight year Brown Tide bloom in Baffin Bay
Edward J. Buskey; University of Texas Marine Science Institute (*Invited Speaker*)

Most harmful algal blooms are ephemeral, lasting for only weeks or months. In the waters of Baffin Bay and the upper Laguna Madre of South Texas, a Brown Tide bloom persisted without interruption for nearly eight years, from December 1989 through October 1997. This small (4-5 μm diameter), previously undescribed phytoplankton species, *Aureoumbra lagunensis*, was typically present at concentrations of about one million cells per ml, which significantly increased the turbidity of these waters. The initiation of the bloom coincided with an extended period of drought which made Baffin Bay extraordinarily hypersaline, which in turn caused the collapse of zooplankton and benthic invertebrate grazer populations. A severe freeze event and fish kill provided a nutrient pulse to fuel the bloom. The persistence of this bloom was thought to be due to a combination of factors, including limited water exchange with the Gulf of Mexico which reduced cell loses through advection, hypersaline conditions which reduced competition with other phytoplankton species, and the lack of grazing on this species by most protozoan and metazoan zooplankton grazers. The environmental impacts of this bloom on Baffin Bay and the upper Laguna Madre included reduced seagrass biomass and abundance, reduced abundance of micro- and mesozooplankton populations, reduced larval fish populations and reduced abundance and biomass of benthic invertebrate macrofauna. A massive freshwater inflow event in the fall of 1997 washed out the brown tide, which was replaced with a blue-green algal bloom. Shorter duration brown tide blooms still occur in Baffin Bay and Laguna Madre.

Historical Water Quality and Environmental Changes in Baffin Bay as Inferred from a Multiproxy Sediment Core Study
[1]Mark Besonen*, [2]Philippe Tissot, [3]Paul Zimba, [1]Mark McKay, [3]I-Shuo Huang, [3]Erin Hill, and [1]James Silliman; [1]Dept. of Physical and Environmental Sciences (TAMUCC); [2]Conrad Blucher Institute (TAMUCC); [3]Center for Coastal Studies (TAMUCC)

Short sediment cores (~1.3-1.7 m) were taken from twelve locations around the main basin and tributary arms of Baffin Bay. The sediment cores were analyzed with a multiproxy suite of analyses to understand the evolution of water quality and environmental change in the system via physical, compositional, and geochemical variations in the sediments. Analyses included a surface reflectance scanning technique coupled with traditional high performance liquid chromatography to document pigment concentrations, magnetic susceptibility and the C/N ratio to infer allochthonous terrestrial/fluvial vs. autochthonous biologic inputs, TOC/carbonate/incombustible sediment fractions via loss-on-ignition to understand changing contributions to the sedimentary record, and sediment grain size distributions via laser granulometry. Chronologic control was provided by Cs-137/Pb-210 analyses on three sediment cores—one from the main basin, and one from each of the two main tributaries. Variability in the proxies is present at different scales, especially in the tributary bays, but one prominent trend from the main basin is a clear increase in pigment concentrations from about 75-80 cm depth up to the present. Chronological control, which is still being refined, suggests this depth may represent approximately the start of the 20th century; thus, it may be related to nutrient loading from increased population and land use changes. Another prominent shift at about 40 cm depth shows a diminution of carbonate accumulation with a corresponding increase in the incombustible fraction (presumably siliciclastic/mineral content). Current

interpretation places this depth to the 1940's, and this shift may potentially be related to the opening of the Intracoastal Waterway.

Three years of water quality sampling in Baffin Bay by "citizen scientists": what have we learned?

Michael Wetz*, Kenneth Hayes, and Emily Cira; Department of Life Sciences, Texas A&M University-Corpus Christi

Here we present results from a "citizen scientist"-assisted water quality study that was initiated in May 2013 in Baffin Bay. Results show distinct interannual patterns in chlorophyll *a* that correspond with rainfall/salinity variability, and seasonal patterns that correspond with water temperature variability. In addition, very high chlorophyll *a* concentrations were observed during high salinity, low inorganic nutrient conditions, highlighting the importance of recycled and/or organic nutrients. Overall, organic nitrogen concentrations were ca. 30-fold higher than inorganic nitrogen, and 3-fold higher in Baffin Bay than in three other large bay systems along the Texas coast. The high concentrations of organic nitrogen compared to inorganic nitrogen may be a key factor in the prevalence and persistence of brown tide blooms in Baffin Bay-Upper Laguna Madre.

A stable isotope study on organic matter driving oxygen consumption in two south Texas estuaries

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In order to elucidate the dissolved oxygen (DO) consumption mechanism in two eutrophic south Texas shallow water estuaries (Baffin and Oso) that are subject to different anthropogenic nutrient stresses (agricultural vs. sewage), we measured DO consumption rates in both water column and surface sediment (~20 cm). We found that the integrated DO consumption rate in water column was slightly higher than that in the sediment in both Baffin Bay (-2.78±2.20 vs -1.55±0.81 g O_2 m^{-2} day^{-1}) and Oso Bay (-2.49±1.93 vs -1.77±0.83 g O_2 m^{-2} day^{-1}). Our observations suggested that both water and sediment were important for DO consumption. Meanwhile, we also examined stable isotope of particulate organic carbon ($\delta^{13}C_{POC}$) in water column, and found that $\delta^{13}C_{POC}$ in Baffin Bay had seasonal range between -28.7±0.4‰ (January) and -22.8±0.7‰ (August), with more ^{13}C-enriched POC found near the bay mouth that is open to Laguna Madre. $\delta^{13}C$ of CO_2 produced by water column microbial degradation of organic matter ($\delta^{13}C_{OCx}$) in Baffin bay (-16.7~ -25.1‰) and Oso bay (-18.6~-21.0‰) was more positive than their respective water column $\delta^{13}C_{POC}$ values (-23.1~-27.7‰ and -20.9~ -23.4‰). Therefore, it appears that the microbial community preferentially utilized ^{13}C-enriched organic carbon in both systems. In addition, stable nitrogen isotope values ($\delta^{15}N$) in Oso Bay (8.4±5.5‰) is statistically more positive than in those in Baffin Bay (4.4±2.8‰, $p<<0.0001$, student t-test), suggesting that these two eutrophied water bodies have distinct nutrient sources.

Ecosystem-based Approach to Assess Black Drum in Baffin Bay

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In 2013, TPWD published the "Emaciated Black Drum Event" report, highlighting the need for information on benthic food resources and Black Drum (*Pogonias cromis*) feeding dynamics

throughout Baffin Bay. Our goal was to conduct a comprehensive, multi-trophic level study to determine linkages between water quality, benthic food resources, and Black Drum. Our hypothesis was that Black Drum exhibit strong fidelity to the Baffin Bay Complex and prefer feeding on the bivalve *Mulinia lateralis*, which in turn exhibits distribution patterns related to local environmental conditions. Our main questions were: (1) Are benthic food resource available throughout Baffin Bay Complex? (2) Are Black Drum using the benthic food resources of Baffin Bay Complex? (3) Are Black Drum remaining within the Baffin Bay Complex? Results indicate that salinity and dissolved oxygen play a strong role in Baffin Bay macrofaunal community dynamics, with significant effects on species diversity, richness, abundance, and biomass. Stomach content and stable isotope analyses indicated that Black Drum are feeding on a variety of benthic prey items, proportional to their availability. Acoustic telemetry revealed that Black Drum appear to be residing within the system for extended periods with minimal egress. Our multi-trophic level approach allowed us to better understand the impact of a potential decline in food sources or an ecosystem-wide trophic shift in Black Drum feeding mode. Multiple stressors are likely acting on the benthic community in Baffin Bay, including high salinities and hypoxia/anoxia. With ongoing dynamic changes in water quality in the Baffin Bay Complex, it is important to continue monitoring food web dynamics to link water quality and estuarine resources.

What factors contributed to the Black Drum emaciation event in Baffin Bay (2012-2013)?

[1]Paul V. Zimba*, [1]I-Shuo Huang, and [2]Zachery Olsen; [1]Center for Coastal Studies, TAMUCC; [2]Texas Parks and Wildlife

During 2012-2014, reports of emaciated black drum prompted TPWD funding an analysis of the food web structure using lipid/fatty acid profiles and multiple stable isotopes (C/N) in Nueces and Baffin Bays. Four trophic levels were evidenced by lδ^{15}N enrichment in both systems. In Fall 2013, lipid content for Nueces Bay (mean) was 6.01%, whereas Baffin Bay averaged 9.54% across all trophic levels. Nueces Bay trophic level 4 had 37% of the lipid content found in phytoplankton, whereas Nueces level 4 fish contained 60.65% of the phytoplankton. Lipid content of level 4 fish in Baffin Bay contained 74% lower lipid content than Nueces Bay. In Spring 2014, trophic level 4 in Baffin Bay contained 48% of level 1 lipids and trophic level 4 averaged over 9%. Insufficient *Mulinia* were found in Baffin Bay to evaluate as a food source, suggesting this food resource was unavailable in densities to support black drum as a major food source. Stable nitrogen isotopic analyses of black drum from Baffin Bay were one trophic level below drum collected in Nueces Bay (10 versus 14 ppm). The area of bivariate space occupied by δ^{15}N and δ^{13}C (i.e., convex hull) suggests that the community of consumers in Baffin Bay occupied a smaller niche area compared to Nueces Bay (with variance amongst species within a given consumer group. Niche spacing among consumers seems to suggest that trophic niches were more tightly packed in Baffin Bay (as evidenced by centroid distance and mean nearest neighbor distance.

Adaptations of a hypersaline resident: A case study of the upper Laguna Madre Black Drum (*Pogonias cromis*)

Zachary Olsen*; Texas Parks and Wildlife Department- Coastal Fisheries Division

The upper Laguna Madre is a hypersaline estuary located on the southern portion of the Texas coast. Black Drum (*Pogonias cromis*) abundance in this system is approximately five times greater compared to other Texas bays and seems to be largely focused in the Baffin Bay region. Additionally, recruitment of juvenile Black Drum in this system is known to be greater by orders of magnitude in some years compared to other systems. While studies of the reproductive biology of this population have shown that maturity occurs, on average, three

years earlier than in other Texas bays and extreme recruitment years have been linked to extreme salinity and temperature events, such environmental parameters have not been directly linked to vital rates (mortality) or to the increased adult population observed for this species. Here, we reexamine the relationship between recruitment and a suite of physiochemical, habitat, and spatial variables using nonlinear model ensemble techniques and further attempt to link identified variables to mortality of juveniles in this system. By directly linking environmental parameters and vital rates we are better able to understand the drivers of this economically and ecologically important population and speculate as to the functionality of this hypersaline habitat in shaping such unique adaptations.

VERTEBRATE SCIENCE

Evaluating Whooping Crane Winter Territories using Home Range Estimators

[1]Nicole Davis* and [2]Elizabeth Smith; [1]Texas State University – San Marcos – Aquatic Research Doctoral Program; [2] International Crane Foundation (*Student Presentation*)

By quantifying and analyzing space use strategies of individuals of a wildlife population, we can improve our understanding of that population's spatial distribution. The purpose of this paper is to use modern kernel density estimators to provide new insight on the spatial distribution of wintering whooping cranes along the Texas coast. We used digitized data of banded birds from surveys conducted between 1988 and 1989 (n=42) and considered two spatial scales to quantify space use of wintering whooping cranes; 90% confidence (home range) and core 50% confidence (core area). We used linear regression analysis to examine variation in home range and core area size in relation to multiple predictor variables. The average home range size for subadult birds was 359.68 km^2 ± 804.30 km^2 (n=15) and 21.77 km^2 ± 22.24 km^2 (n=16) for paired/family birds. The best model to explain wintering whooping crane home range size included the landcover types barren, grassland, live oak, marsh, and water, and the modified Simpson's diversity index. Based on model averaging results, paired/family wintering whooping crane core area sizes increased with decreasing percent marsh (P=0.001) and increase with increasing habitat diversity (P=9.58e-05), suggesting wintering whooping crane distribution is consistent with the resource dispersion hypothesis. Our results suggest core area size is dependent upon habitat diversity not just the presence of salt marsh and that one habitat type cannot intrinsically define their core area size. Therefore, future conservation strategies should consider the different spatial use among subadults and paired/family whooping cranes.

Does elevated salinity induce a physiological response in Texas diamondback terrapin (*Malaclemys terrapin littoralis*)?

Lindsey Ramirez*, Aaron Baxter, Paul V. Zimba, and Kim Withers; Center for Coastal Studies at Texas A&M University – Corpus Christi (*Student Presentation*)

This study evaluated the physiological effects of elevated salinity on blood chemistry in the Texas diamondback terrapin (*Malaclemys terrapin littoralis*) within the Nueces and Mission-Aransas Estuaries. Terrapins (n = 105) were captured during April 2015 – November 2015 from Nueces Bay, Oso Bay, and Goose Island State Park. A blood sample was drawn from the subcarapacial sinus vein and morphometric data was recorded for each individual captured. First time captures were scute notched and PIT-tagged as part of an ongoing mark-recapture study. Plasma samples were analyzed using an electrolyte panel ($Na+$, $Cl-$, $K+$, and CO_2). There were significant differences between the three bay systems for glucose (F = 4.45; df = 2;

p = 0.0147), potassium (F = 22.57; df = 2; p = <.0001), CO_2 (F = 4.06; df = 2; p = 0.0209), and salinity (F = 9.14; df = 2; p = 0.0003). There were also significant differences between males and females within Oso Bay for glucose (F = 7.53; df = 1; p = 0.0116) and potassium (F = 7.64; df = 1; p = 0.0106), and within Nueces Bay for CO_2 (F = 4.27; df = 1; p = 0.0450). Further analysis of plasma samples will include blood chemistry panels and ELISA tests for stress hormone production. The results of this research provide the first physiological assessment of Texas diamondback terrapins under elevated salinity conditions utilizing hormones as indicators.

Sea Turtle Nesting on Mustang and San Jose Island Gulf Beaches

Anthony F. (Tony) Amos*; University of Texas Marine Science Institute

The Animal Rehabilitation Keep (ARK) has been monitoring sea turtle strandings in the Coastal Bend for 35 years. More than 5,000 stranded turtles have been logged. About 50% were alive but injured or sick and were taken to the ARK for rehabilitation and ultimate release. Nesting sea turtles are not included in this data set and are not strandings. The first confirmed sea turtle to nest on Mustang Island Gulf beach in recent times was a Kemp's Ridley (*Lepidochelys kempi* [LK]) found in 1985. As the population of this most endangered of sea turtles has increased in Mexico and Texas, formalized turtle nesting patrols were started on both Mustang and San Jose Island Gulf Beaches in 2003. Since then 67 nests or identifiable sets of tracks have been found, 56 LK, 10 Loggerhead (*Caretta caretta* [CC]) and one Green (*Chelonia mydas* [CM]). This paper reports on the impediments to successful nesting presented by alteration of the natural beach profile by beach management methods on popular Mustang Island compared to the remote San Jose Island beach where motorized traffic is rare and beach management is not practiced. The ARK has recently obtained DWH Restore funding to continue its work on sea turtle nesting, stranding, and rehabilitation.

Movements of juvenile Kemp's ridley sea turtles (*Lepidochely kempii*) from estuarine waters of the northwestern Gulf of Mexico via satellite telemetry

[1]Tasha L. Metz*, [1]Katie I. St. Clair, [2]Mandi L. Gordon; [1]Texas A&M University at Galveston Department of Marine Biology; [2]Environmental Institute of Houston, University of Houston – Clear Lake

Continued recovery of the endangered Kemp's ridley sea turtle (*Lepidochelys kempii*) depends, in part, on a comprehensive examination of juvenile neritic habitat use. Satellite telemetry is a valuable tool for examining long-term movements and identifying critical foraging habitat essential to population growth and health, as well as revising recovery plans and assessing potential threats to sea turtle survival. To this end, entanglement netting and satellite tracking surveys were implemented to assess juvenile Kemp's ridley habitat use in three estuaries of the northwestern GOM - 1) Lake Calcasieu, LA; 2) Galveston Bay, TX; and 3) Matagorda Bay, TX. Sirtrack KiwiSat 202 transmitters were attached to nine juvenile neritic-stage ridley turtles captured and released in these estuaries during the months of June-August 2006-2015. Tracks were filtered using ARGOS location accuracy codes (excluding Z locations), elevation (< 0.5 m), turtle speed (< 5 km/h) and turning angle (< 15˚). All but one ridley utilized both estuarine and offshore waters, and all ridleys remained within 39 km of shore (mean distance from shore = 6.4 km, n = 602 accepted locations). Most turtles stayed within waters adjacent to tidal passes of the estuaries in which they were captured/released (mean = 21.3 km from release location), with the exception of two turtles that departed Lake Calcasieu and Galveston Bay. Additional tracks, with longer durations, could facilitate our understanding of seasonal migrations and core use areas. Future studies should also incorporate acoustic telemetry to examine fine scale movements and habitat associations within estuarine areas.

VEGETATION

Changes in seagrass distribution and community composition using long-term monitoring along the Texas coast

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Seagrasses are prominent benthic plants found in many Texas bays, whose expansive underwater meadows provide essential food and habitat for commercially and ecologically important species. Since several areas within the Coastal Bend and Laguna Madre have experienced recent declines in seagrass coverage, monitoring efforts are essential to better understand the current distribution and condition of seagrasses in Texas. We conducted water quality and seagrass monitoring at 558 stations during late summer (August through October) from 2011-2014 in three regions of the Texas coast: the Coastal Bend (CB; n = 98), Upper Laguna Madre (ULM; n = 178) and Lower Laguna Madre (LLM; n = 282). Repeated measures ANOVAs were applied to each region testing the effect of region and year on percent cover for *Halodule wrightii*, *Thalassia testudinum*, and *Syringodium filiforme*. In CB, there were no significant changes in percent cover for any species. However, we observed a massive decline in *S. filiforme* cover ($p < 0.001$) in ULM beginning in 2013, which occurred after an extended period of hypersalinity (> 55) driven by regional droughts. In LLM, *H. wrightii* cover increased ($p < 0.001$) from 2011-2014 in the northern and central areas of the bay. Coverage of *T. testudinum* and *S. filiforme* in southern LLM was variable from 2011-2014. Our results indicate that changes in seagrass coverage and community composition along the Texas coast varied through time and were highly location-specific. Our monitoring program provides critical information to coastal resource managers by describing current seagrass meadow extent, and highlighting areas that have undergone rapid changes in community structure.

Macroclimatic change expected to transform coastal wetland ecosystems this century

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Coastal wetlands have exceptional ecological and economic value, yet sustain continued loss globally despite concerted conservation and restoration efforts. Due to their position at the interface between land and sea, coastal wetlands are highly vulnerable to climatic and other global changes. It is well established that macroclimatic drivers (temperature and precipitation regimes) strongly influence coastal wetland ecosystem structure and function around the world. However, the vast majority of research on climate change impacts in coastal wetlands has focused on sea-level rise. Macroclimatic drivers have been largely ignored, despite their documented capacity to transform plant community structure. For example, increases in temperature can drive marsh-to-mangrove conversions, and changes in precipitation can drive vegetated-unvegetated transitions. Such changes have powerful effects on the ecosystem services provided by these systems. We modeled wetland plant community structure based on macroclimate using field data collected across the northern Gulf of Mexico coast (south Texas to south Florida) along broad temperature and precipitation gradients. Our analyses reveal strongly nonlinear temperature thresholds that govern the potential for marsh-to-mangrove

conversion, as well as nonlinear precipitation thresholds that regulate dominance by various plant functional groups. Based on current and projected future climatic conditions, we use our macroclimatic models to demonstrate that transformative ecological changes in coastal wetland plant communities are probable throughout the region, even under conservative climate scenarios. Furthermore, because coastal wetland ecosystems are functionally similar worldwide, we expect changes in this region are also indicative of potential future changes in climatically similar coastal regions globally.

Abstracts for Poster Presentations

Is Low-Profile Worthwhile? Investigating the effect of low-profile artificial reef patch size on juvenile Red Snapper (*Lutjanus campechanus*) recruitment

D. Alex Alder* and Richard Kline; School of Earth, Environmental, and Marine Sciences, University of Texas Rio Grande Valley (*Student Presentation*)

Low-profile artificial reefs may be beneficial to supplement fisheries by providing simple hard-bottom substrate for reef fish species at various life stages. In this study, we set out to determine the optimal size patch reef to recruit juvenile red snapper (*Lutjanus campechanus*). Cinder blocks were arranged in eight arrays with replicates of: single block, 2 blocks, 4 blocks, and 16 blocks away from any hard substrate. Arrays will be monitored for one year and reef fish abundance and size classes at each replicate recorded. Preliminary surveys have revealed juvenile red snapper at several patch sizes. This suggests that deployment of low-profile structures near existing artificial reefs may be an effective tool to increase juvenile recruitment.

Evaluating Ecosystem Resilience Following a Salinity Disturbance in Baffin Bay, TX

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Baffin Bay, Texas, is a hypersaline estuary with salinity structure driven by evaporation rates that usually exceed freshwater delivery. El Niño conditions in spring and early summer of 2015 led to unseasonably wet conditions in the watershed, causing salinities to fluctuate a remarkable 50 psu over a 9 month period. Long residence times (300 days to several years) mean that Baffin Bay is continuing to experience an altered ecosystem state, making it an ideal time to examine benthic community dynamics, and the resultant effects on higher trophic levels. The Laguna Madre is an adjacent but more hydrologically stable system which was less affected by the 2015 salinity event. We will use infaunal community characterization and stable isotope analyses to evaluate these systems as the salinity in the Baffin Bay returns to a 'normal' hypersaline state. Preliminary data have shown that the two systems contain significantly different food resources and community structure despite their close proximity. Comparing these distinct systems simultaneously will allow us to better understand the direct effects of extreme salinity change on ecosystem resilience.

A study of disturbance theory and diversity maintenance in a freshwater-limited estuary

Crystal Chaloupka* and Paul Montagna; Texas A&M University -Corpus Christi (*Student Presentation*)

Rincon Bayou, part of the Nueces Estuary located in south Texas, has been subject to many field studies over the past few decades to support adaptive management of freshwater inflows to the estuary. Many of these studies have focused on how freshwater inflow into the delta affects the estuarine benthic community structure. Benthic invertebrates (or macroinfauna) are commonly used as bioindicators of the marine habitat's health. The primary premise of the current study is that freshwater inflow can act as a disturbance and ecological theory, i.e., the intermediate disturbance hypothesis, which predicts that bioindicators of ecological integrity (i.e., diversity) will decline. However, Rincon Bayou consistently exhibits low diversity index values with little change over time with changing flow or salinity, and therefore, diversity was not a significant indicator in this anthropogically-stressed environment. Rincon Bayou does not

exhibit an intermediate phase between disturbances and therefore the intermediate disturbance hypothesis did not apply to this estuarine habitat. Rincon Bayou is in a constant state-shift between the extremes of droughts and floods, being persistently disturbed, with salinity playing a major role in structuring the benthic community. Current management of the Rincon Bayou pipeline delivers water only during floods, which makes the floods wetter and the droughts drier. As a result, current flow regimes into Rincon Bayou are not effective to promote optimal ecological integrity in this stressed environment.

The trophic ecology of porcelain crabs *Petrolisthes spp*. on oyster reefs?
Josette Delgado*, Kim Withers, and Paula Rose; Texas A&M University – Corpus Christi (*Student Presentation*)

Porcelain crabs are found in dense populations in tropical and subtropical estuaries worldwide and are important components of oyster reef ecosystems. They are thought to primarily consume phytoplankton, but in recent laboratory studies porcelain crabs also readily consumed zooplankton, which provided as much as 200 times more energy than a mixed microalgae diet. There is little known about the feeding behavior of porcelain crabs in their natural environment. Stable isotopes of carbon and nitrogen were used in this work to identify porcelain crab prey and the crab's trophic level in Copano Bay, Texas. Muscle tissue from porcelain crabs taken from three sites in the bay were analyzed for their carbon and nitrogen isotopic ratios during the spring and fall. Porcelain crab muscle tissue fall $\delta^{13}C$ mean value was -16.4 ± 0.3‰, while the $\delta^{15}N$ mean was 8.0 ± 0.1‰. During the spring, the $\delta^{13}C$ mean value was -21.5 ± 0.3‰ and the $\delta^{15}N$ nitrogen mean was 10.1 ± 0.8‰. There was no variation in porcelain crab isotopic composition within and among sites. However, there were seasonal differences within locations in Copano Bay. Porcelain crab δ15N isotopic ratios were heavier during the spring sampling period, which may be due to eutrophication that occurred from agricultural runoff in the bay at site two. The increase in phytoplankton biomass from nutrient loading may have altered the carbon pool in this study area, which would explain the carbon enrichment in the fall. These crabs are important connectors for primary producers and higher trophic levels.

Applying marine debris education and outreach programs to decrease littering behavior
Stephanie Dubois* and Abdullah Rahman; Dept of Biology at the University of Texas Rio Grande Valley (*Student Presentation*)

Marine debris is any manmade persistent solid material that is disposed of (intentionally or by accident) into the world's oceans. Fishing, tourism and urban development are among the major factors in the dispersion of marine debris. Up to 80% of all marine debris, including beach litter, are derived from land-based sources. These land-based sources create waste that is then transported through the watershed via large rivers to the ocean. The aim of the study is to determine the effectiveness of marine debris education and outreach programs in changing littering behavior of youth located along the Arroyo Colorado watershed. Students that visit the Coastal Studies lab experience a day in the field through an "Ecotour" followed by a marine debris presentation and shark dissection. The effectiveness of the program was evaluated using pre and post surveys. The surveys used fact, opinion and behavioral questions in order to understand any changes that occurred before and after the education program. Factual questions saw the highest average percent increase (31%) followed by opinion questions (16%) and then behavioral (3%). Behavioral answers averages were high in both the pre and post surveys, not allowing for a high percent increase. The results of the pre and post surveys indicate that marine debris education and outreach programs may lead to a change in behavior and opinion regarding marine debris.

Biophysical Impacts of Sea Level Rise Policies in Texas

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The Galveston Bay area in Texas is at particular risk of sea level rise (SLR) induced hazards because of its unique geography and geology, including relatively high subsidence rates due to mineral and groundwater extractions. SLR is an "enormously complex public policy problem" because beaches have a dynamic nature while laws are static (Caldwell and Segall, 2007). This study examines the effects that various development policies could have on community resilience. Using the Sea Level Affecting Marshes Model (SLAMM), the possible effects of SLR under five development policy scenarios are examined in four regional subsites that each represent a different natural and built environment. The policy scenarios are "no dikes" which serves as a control and employs no shoreline protection, business as usual which models the current situation regarding development and armoring, green infrastructure which shows what may happen if living shorelines were used instead of dikes, shoreline armoring which describes the armoring of the entire coastline, and organized retreat which simulates potential impacts of SLR if people removed structures and moved inland away from the rising seas. Coastal habitats and their ecosystem services are hypothesized to be most reduced under the armoring and business as usual scenarios due to coastal squeeze. Initial results indicate that over 700 hectares of developed land just in Surfside Beach, TX would be inundated under 1.8m of SLR by 2100 in a business as usual policy scenario. Action should be taken immediately to develop policies that foster resiliency and avoid the worst outcomes for both human and non-human communities in Galveston Bay. This work is part of a larger study on living with sea level rise along the Texas coast.

Phylogeography of an estuarine copepod, *Acartia tonsa* (Calanoida: Copepoda) from the Texas Gulf of Mexico

Nicole Figueroa*, David Hicks, and Diego Figueroa; School of Earth, Environmental, and Marine Sciences, University of Texas Rio Grande Valley, Brownsville, TX (*Student Presentation*)

Acartia tonsa (Dana, 1849) is a calanoid copepod of the family Acartiidae. This species has a worldwide distribution and it is often the dominant species of zooplankton in estuaries, playing a key role in the trophic dynamics of these ecosystems as a consumer of phytoplankton and as a main source of food for larger organisms. Due to its cosmopolitan distribution, it was assumed that *A. tonsa* had little or no genetic variability between populations. But recent genetic studies have shown that despite being morphologically identical, there are multiple distinct lineages. These studies have focused in estuaries along the United States' east coast and the eastern Gulf of Mexico (GOM). The goal of this research is to determine the genetic structure of *A. tonsa* in the Texas GOM and to integrate this data with that of the east coast and eastern GOM in a phylogeographic analysis. As in previous studies, we will use the mitochondrial gene cytochrome c oxidase subunit I (MtCOI). The hypothesis for this project is that there will be a strong correlation between the genetic structure of this species and the dominant coastal circulation, showing a pattern of dispersal and speciation in a northeastern direction. Preliminary results based on a reconstructed phylogeny support this hypothesis, showing basal lineages in southern localities and more derived lineages arising further east and north, following the path of the Gulf current.

Identification and Quantification of Seagrass Algal Epiphytes

Melissa Fisher*, Lucas Martinez, and Kirk Cammarata; Texas A&M University-Corpus Christi, College of Science and Engineering, Department of Life Sciences (*Student Presentation*)

This study initiated an inventory of epiphytic algal species found on seagrasses near Corpus Christi, Texas. Seagrass communities critically support diverse and economically beneficial fisheries. Epiphytic algae are primary producers providing food for higher trophic level foragers. Higher than average rainfall this year created hyposaline conditions in local bays and the resultant influx of nutrients is expected to impact both the presence and prevalence of different algae. Understanding the epiphyte community dynamics will facilitate epiphyte-scanning-based indicators of water quality which can be calibrated to community characteristics. All 5 local seagrasses were harvested from Redfish Bay and imaged with both visible and fluorescence scanners to characterize epiphyte accumulation patterns as a more robust alternative to dry biomass measurements. Algal epiphytes were dissected, identified, and collected for subsequent DNA fingerprinting (18S RNA, 16S RNA, rbcL, CO1, ITS2). We have tentatively identified 15 epiphyte taxa, finding a prevalence of red algae, abundant diatoms and cyanobacteria, but a deficiency of greens and browns. Notable differences were observed between the different seagrass host species.

Determining the Genetic Diversity of Kemp's Ridley (*Lepidochelys kempii*) Sea Turtles Using Mitochondrial Genomes

Hilary Frandsen* and Diego Figueroa; University of Texas Rio Grande Valley (*Student Presentation*)

Understanding the genetic diversity of endangered species is critical to determine the longevity of the population. In 2010, the Kemp's Ridley (*Lepidochelys kempii*) sea turtle experienced an abrupt interruption of 35 years of positive growth, leading to population decline in 2013. Studies assessing the impact of the abrupt population decline on the diversity of remaining individuals are essential for management of the species. I propose to quantify the genetic diversity of the Kemp's ridley population on South Padre Island and of captive ridleys by sequencing full mitochondrial (*mt*) genomes. I hypothesize that there is low genetic diversity in females on South Padre, and higher diversity in captive ridleys held across the country. The *mt* genomes will be obtained from full genomic DNA extractions followed by multiplexed massively parallel sequencing on the Illumina platform. If greater diversity is found in captivity than on South Padre, this could indicate that the local population has suffered a loss of genetic diversity, and/or there is limited recruitment into the South Texas population from other rookeries.

Utilizing accelerometer telemetry tags to compare red snapper (*Lutjanus campechanus*) activity budgets over natural and artificial reefs

Ethan Getz* and Richard Kline; Department of Biological Sciences, University of Texas Rio Grande Valley (*Student Presentation*)

Oil platforms and ships are popular reef materials in the Gulf of Mexico because they provide suitable habitat for important reef fish such as red snapper (*Lutjanus campechanus*). However, many questions remain regarding the differences between natural and artificial reef habitats and which structures are optimal. In this study, activity budgets and habitat preferences of red snapper are being analyzed over natural and artificial reefs using accelerometer telemetry tags. Overall dynamic body acceleration (ODBA) is being used to estimate energy expenditure over three reef types (submerged ships, oil platforms, and natural reefs). Red snapper were surgically implanted at depth to reduce the stress of barotrauma and will be passively

monitored for one year. The results of this study will help determine which artificial reef configurations are most beneficial as red snapper habitat.

Combined sidescan and parametric sonar mapping of seagrass habitat & associated sediments

Austin Greene*, Abdullah Rahman, and Richard Kline; University of Texas Rio Grande Valley (*Student Presentation*)

Global Seagrass habitats are in decline, threatening $1.9 trillion dollars in ecosystem services and a great number of estuarine species. Despite the value of these systems, mapping efforts continue to rely on point-based data. Additionally, few mapping strategies account for the below-ground rhizome structure of seagrasses, or the carbon-rich sediment layers they create. Here we present preliminary results on a novel method of combining sidescan and parametric sonar imagery to gain a transect-based, "2D plus" map of both aboveground seagrass (*Thalassia testudinum*) productivity and belowground carbon content of associated sediment layers. Our preliminary results indicate that this method can overcome the limitations of point-based data and provide a spatially-distributed toolset for seagrass monitoring.

Spatial and temporal distribution of organic carbon and nitrogen in a eutrophic estuary (Baffin Bay, TX)

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Baffin Bay is a shallow (~1-2 m), long-residence time (>1 year) estuary that is experiencing symptoms of eutrophication, including episodic hypoxia and mortality of important fish and shellfish species. Over the past 30 years, water temperatures have also increased by ~2° C as well. At present, the sources of organic matter contributing to hypoxia formation are largely unknown, as are the physical dynamics that facilitate hypoxic events. Here we present results from the first three years of a volunteer water quality monitoring study that demonstrate the spatial-temporal distribution and dominant forms of organic matter in Baffin Bay. Extremely high organic carbon concentrations (>2000 μmol L^{-1} at times) have been observed in Baffin Bay, where dissolved organic carbon (DOC) concentrations are five times higher on average than particulate organic carbon (POC). DOC concentrations display a sharp concentration gradient from the upper Baffin Bay to the mouth, suggesting possible tributary sources. Dissolved organic nitrogen (DON) concentrations are also very high year round, and typically exceed inorganic nitrogen concentrations. The DON concentrations are 2-3 times higher than those observed in other estuarine systems of the Texas coast and predominance of DON over DIN may contribute to dominance by *Aureoumbra lagunensis*, which is a mixotroph. Results will be integrated with those from complementary studies assessing oxygen variability using a sensor network as well as from experiments on the lability of organic matter from known sources to present a comprehensive view of hypoxia dynamics in this vital South Texas estuary.

An introduction to the instrumentation and analytical applications of the Core Facilities Laboratory at UT–MSI

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The Stable Isotope and Elemental Analysis Core Laboratory at The University of Texas at Austin – Marine Science Institute was established in 2015. The goals of the Core Laboratory are to provide cost effective analyses, strict QA/QC oversight and increased sample throughput. The Core Laboratory combines hands-on and theoretical student training to provide students with critical analytical chemistry experience to expand education and career opportunities. Current analytical instrumentation includes. (i) Thermo Delta V Plus Isotope-Ratio-Mass-Spectrometer (IRMS) connected to a Trace GC 1310-Isolink and Gasbench II through a Conflo IV interface. The Trace GC 1310-Isolink separates complex samples of interest (fatty acids, *n*-alkanes, alcohols and amino acids) for carbon- and nitrogen-compound specific stable isotopic analysis. The Gasbench II is used to analyze the oxygen- and hydrogen-isotopic composition of water, the carbon isotopic composition of dissolved inorganic carbon and the carbon- and oxygen-isotopic composition of carbonates. (ii) Thermo Delta Plus XL IRMS connected to a Carbo Erba NC 2500 Elemental Analyzer through a Conflo II interface. This instrument is used to measure carbon- and nitrogen-isotopic compositions of marine material such as sea grass, soils/sediments, fish tissue and nutrient filters. (iii) Thermo Flash 2000 CHN Elemental Analyzer is used to measure the elemental abundance of carbon, hydrogen and nitrogen in marine systems (marine sediment, soil, nutrient filters and fish tissues). The spectrum of analytical capabilities and high sample throughput of the Core Laboratory will significantly enhance environmental research productivity at the Institute, and offer commensurate analytical services to regional customers.

Charting the Gulf: Analyzing the Gaps in Long-term Monitoring of the Gulf of Mexico

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Restoration and recovery of the marine ecosystem from the BP oil disaster will require a system of integrated assessment programs to track the status and recovery of injured resources. To do this efficiently it will be essential that restoration mangers coordinate across restoration efforts. There is a foundation of monitoring infrastructure in the region that gathers information on different components of the marine ecosystem. Ocean Conservancy has assembled an inventory of long-term monitoring activities in order to identify those that could track recovery of injured resources and critical ecosystem drivers. During our analysis we identified important gaps based on identified monitoring priorities and needs. In addition to identifying monitoring efforts and priorities for natural resources in the NRDA injury categories, we documented the spatial and temporal coverage of the monitoring programs along with their sampling frequency and other related information. Our hope is that a science-based evaluation of resource information needs will lay the foundation for recovery planning, and be integrated with supplemental research and monitoring to support a comprehensive ecosystem assessment framework. We will present results of this gap analysis with conclusions on long-term monitoring needs in the Gulf of Mexico.

Assessing the efficacy of reef restoration efforts by comparing nekton abundance in Corpus Christi Bay, Texas

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Habitat degradation by natural and anthropogenic influences has lead to a rapid decline in near-shore ecosystems across the globe. Estuarine ecosystems often struggle to recover naturally from anthropogenic stressors, necessitating the development and incorporation of effective restoration strategies. In Nueces Bay, TX, a local nonprofit restored over 40 acres of salt marsh, and we investigated community assemblages between restored marsh areas and adjacent natural marsh sites. Nekton data collected using a combination of throw trap and suction sampling was compared between natural and restored marsh sites. Preliminary analysis found no significant differences in shrimp abundance, fish abundance, or total abundance of species present between the natural and restored sites, suggesting the restoration is suitable habitat for these organisms. A significant difference ($p<0.05$) was shown in total crab abundance with natural sites (mean=9.5) having more than twice the crab abundance when compared to restored sites (mean=3.8). Initial results on the efficacy of the restoration are promising, however, additional monitoring and data analysis is required.

Impacts of Environmental Hypoxia on Global DNA Methylation in Red Snapper

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Epigenetic modifications such as DNA methylation and histone acetylation impact developmental processes in vertebrates. However, little is known about the epigenetic modifications occurring in aquatic vertebrates during exposure to environmental hypoxia. In this study, we investigated the changes in global DNA methylation and regulation of the related enzyme, DNA methyltransferase (DNMT), in hepatic tissues of red snapper after chronic exposure to hypoxia (dissolved oxygen 1.7 mg/L for 4 weeks). Chronic hypoxia exposure caused marked increases in the immunoreactive (IR) expression of ssDNA, dsDNA, and 8-hydroxy-2-deoxy guanosine (8-OHdG, a key marker of oxidative DNA damage) and decreases the mRNA levels of IGFs in hepatic tissues. The IR intensities of DNMT, 5-methylcytosine (5mC, a methylated form of DNA base cytosine), and histone H3K4 trimethyl (H3K4me3, a histone protein involved in the structure of chromatin) were markedly increased in hepatic tissues after hypoxia exposure. Collectively these results suggest that hypoxia leads to induction of DNA methylation through the related enzyme, DNMT, which might be involved in epigenetic modifications during exposure to environmental hypoxia in aquatic vertebrates.

Dynamic Zooplankton Communities on Mesophotic Reefs

Samantha Silvestri* and Diego Figueroa; The University of Texas Rio Grande Valley (*Student Presentation*)

Mesophotic coral reefs are a unique habitat that scientists have only begun to study within the last decade. Little is known about the mesophotic reefs found along the South Texas Banks (STBs) in the Gulf of Mexico, which is why this area failed to be deemed a marine protected area (MPA) following consideration in 2008. To learn more about the STBs, this study is aimed at assessing the community structure of zooplankton at six different sites. Water column profiles will be taken of salinity, temperature, turbidity, chlorophyll and phycoerythrin; currents and circulation will be measured; and zooplankton samples will be obtained via vertical tows at each site. This will allow for the assessment of different zooplankton species over the reefs and correlation of physical data to community composition. The consumption of zooplankton will

also be measured by examining differences in biomass of a given aggregate of organisms before and after being carried through the reef by currents. This will aid in creating a baseline of data regarding the community and trophic dynamics of mesophotic reefs as a whole. This study will not only contribute to novel knowledge about a previously understudied habitat, but will provide further implications for the STB's to be deemed an MPA in the future.

Identifying beach zones along the south Texas Gulf Coast by the use of UAS hyperspatial RGB imagery

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Shoreline information is fundamental for understanding coastal dynamics and for implementing environmental policy. The analysis of shoreline variability usually uses a group of shoreline indicators visibly discernible in coastal imagery, such as the seaward vegetation line, wet beach/dry beach line, and instantaneous water line. These indicators partition a beach into four zones: (1) vegetation; (2) dry sand or debris; (3) wet sand; and (4) water. These shoreline indicators can be recognized when the four beach zones are identified. UAS remote sensing can acquire imagery with < 10 cm pixel size, referred to as hyperspatial imagery, to map these four beach zones. The method consists of 4 steps: (1) Geo-referencing, co-registration and mosaicking; (2) computation of GLCM and LBP textures on various window sizes and pixel sizes; (3) unsupervised classification with these texture factors; and (4) accuracy assessment. Preliminary results show that classification accuracy can reach 81.7% for LBP textures using the green band. LBP textures perform marginally better than GLCM textures. The GLCM accuracy is 78.5%, 77.8% and 79.4% for red, green and blue, respectively. The experiments demonstrate the capability of the image processing and feasibility of the classification approach. Our software can rapidly produce UAS orthoimages and mosaic them without manual tuning. The unsupervised classification can produce meaningful results for further analysis.

Demographics, distribution, and genetic variation in the Texas diamondback terrapin (*Malaclemys terrapin* littoralis) within the Corpus Christi and Aransas Bay systems

Shantel Swierc*, Kim Withers, and Aaron Baxter; Center for Coastal Studies at Texas A&M University- Corpus Christi (*Student Presentation*)

The goals of this research are to determine the population genetics and population dynamics of the Texas diamondback terrapin (*Malaclemys terrapin littoralis*) within the Nueces/Corpus Christi Bay and Aransas Bay estuaries on the central Texas coast. A total of 105 terrapins were captured between April 2015 and December 2015. Photographs, standard measurements, body condition score, sex, age estimates, physical abnormalities, scute notches and PIT tags were all performed and applied for each individual. Preliminary captures, sex ratios, and standard measurement data for individual males and females are currently being analyzed, providing insight on the demographics of Texas diamondback terrapins in the study sites. The sex ratios from the three sites for female to male were 4:1 (Nueces), 1:8.1 (Oso), and 2.3:1 (Goose Island). There was a significant difference between the sample sites for female weight ($DF = 2$; $F = 6.51$; $p = 0.0027$), female carapace height ($DF = 2$; $F = 4.19$; $p = 0.0198$), male weight ($DF = 2$; $F = 7.58$; $p = 0.0017$), and male carapace height ($DF = 2$; $F = 5.22$; $p = 0.0099$). Blood samples were drawn from all captured individuals to genetically compare individuals within, and across, these bay systems using microsatellite DNA analysis. DNA analysis will be performed on a ABI 3730xl DNA Analyzer, utilizing a multiplex PCR strategy involving M13 fluorescent labeled forward primers and the same 12 SSR primers that multiple previous studies have used for this species.

Spatial and temporal settlement patterns of blue crab (*Callinectes sapidus* and *Callinectes similis*) in a drought-prone Texas estuary: results from a citizen science monitoring project

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The Citizen Science Larval Blue Crab Monitoring Project was created in 2012 to investigate temporal and spatial settlement patterns of larval blue crabs (*Callinectes sapidus*, the Atlantic blue crab, and *Callinectes similis*, the lesser blue crab) within the Mission-Aransas National Research Reserve. Blue crabs are an ecologically and economically important species in Texas, where they support a multi-million dollar commercial crabbing industry and serve as a major food source for many species including the endangered Whooping Crane and important sport fish such as the Red Drum. Fisheries data from the Texas Parks and Wildlife Department indicate that blue crab populations have been declining since the 1980s. Overfishing, habitat loss, limited freshwater inflow, and reduced larval recruitment could be factors contributing to decreased blue crab populations in Texas bays and estuaries. Citizen scientist volunteers donated approximately 2000 service hours collecting samples from five monitoring sites over a four year period. Passive zooplankton collectors were deployed daily for 24 hours, samples were rinsed into collection vials, and their contents were preserved in ethanol for later identification and enumeration. Results suggest that large numbers of blue crab larvae are common in nearshore waters of the Gulf of Mexico, but only a small percentage recruit into the estuary. Peak periods of ingress into the estuary occur during fall and winter months, with *C. sapidus* primarily contributing to the fall peak and *C. similis* dominating the winter peak. More data are needed to determine factors impacting larval blue crab recruitment, such as limited freshwater inflow.

Continued Monitoring of Community Development in Restored Saltmarsh (*Spartina alterniflora*) Habitat

Eric White*, Ryan Rezek, and Jennifer Beseres Pollack; Texas A&M University-Corpus Christi (*Student Presentation*)

Saltmarsh habitat plays a crucial role in Gulf of Mexico coastal systems. In 2011, the Coastal Bend Bays and Estuaries Program (CBBEP), to compensate for habitat loss during construction of the U.S. Highway 181 Causeway, undertook a saltmarsh restoration project in Nueces Bay. The restoration included the creation of ~150 acres of marsh habitat and planting of 31,000 *Spartina alterniflora* plants. The nekton community in the restored and adjacent natural saltmarsh habitats was sampled using a modified epibenthic sled in in May and August of 2014 and 2015, as well as in February of 2015. Stem counts of *Spartina alterniflora* were performed in each sample site to assess habitat recovery. Total nekton abundance was compared between both sites and sampling dates with 2-way mixed effects ANOVA. The restored habitat was found to support similar nekton abundance as the natural saltmarsh during the May sampling period both years and significantly greater nekton abundance during the August and February periods of 2014. The natural saltmarsh supported greater abundance in August 2015. Reduced nekton abundance observed in the natural marsh was attributed to wrack disturbance, while the physical design of the restored saltmarsh protected the sample sites from inundation. Higher abundance observed in the natural marsh in August 2015, was likely due to the higher water level preventing wrack from depositing in the natural sites. These findings demonstrate the proficiency of restored saltmarsh habitat in supporting nekton communities and highlights how constructed habitats can resist physical disturbances that may impact adjacent communities.

Using total dissolved amino acids to evaluate production and bioavailability of dissolved organic nitrogen in Lavaca and San Antonio Bays

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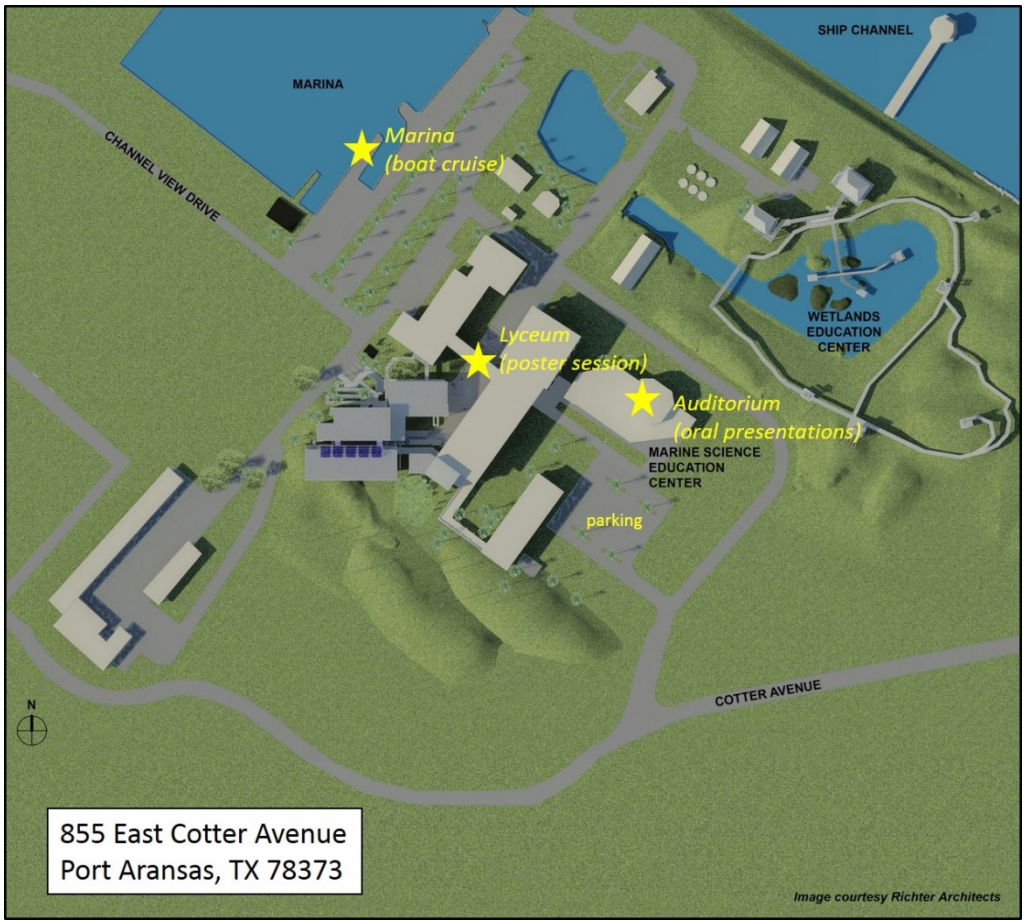
Inorganic nitrogen is the traditional focus when studying coastal eutrophication, yet recent studies suggested that a major fraction of dissolved organic nitrogen (DON) is labile and can be rapidly transformed to inorganic forms. Here we examined concentrations and composition of total dissolved amino acids (TDAA), presumably the most labile fraction of DON, in the Lavaca and San Antonio Bays in south Texas. Concentrations of TDAA showed conservative mixing in both the Lavaca and San Antonio Bays, decreasing with salinity in the range of 10 to 30 PSU, yet they were much lower at the river end; this pattern suggests that TDAA, as well as DON, were likely produced in the salinity region of 0-10 PSU. We also found that concentrations of TDAA were much higher in Lavaca Bay (2.8-5.8 μmol/L) than those in San Antonio Bay (1.8-2.8 μmol/L), even though the levels of inorganic nutrients and Chl *a* were similar between the two bays. Consistently, the ratios of TDAA/DON, a recently-proposed index for ecosystem productivity, were in the range of 0.10-0.12 in the San Antonio Bay, much lower than those (0.13-0.24) in the Lavaca Bay ($p<0.01$). This indicates higher primary production in the Lavaca Bay, which is intriguing given the similar nutrient and Chl *a* levels between the two bays. Future plans include conducting laboratory incubations to evaluate bioavailable fraction of DON and using high-end mass spectrometry to characterize chemical structure of DON in these bays.

Campus Map



Main campus of The University of Texas Marine Science Institute

The University of Texas Marine Science Institute is dedicated to the three central functions of a major university (research, education, and outreach) as they apply to the Texas coastal zone and other marine environments. As an organized research unit of The University of Texas at Austin, the main goal of the Marine Science Institute is to improve our understanding of the marine environment through rigorous scientific investigations.

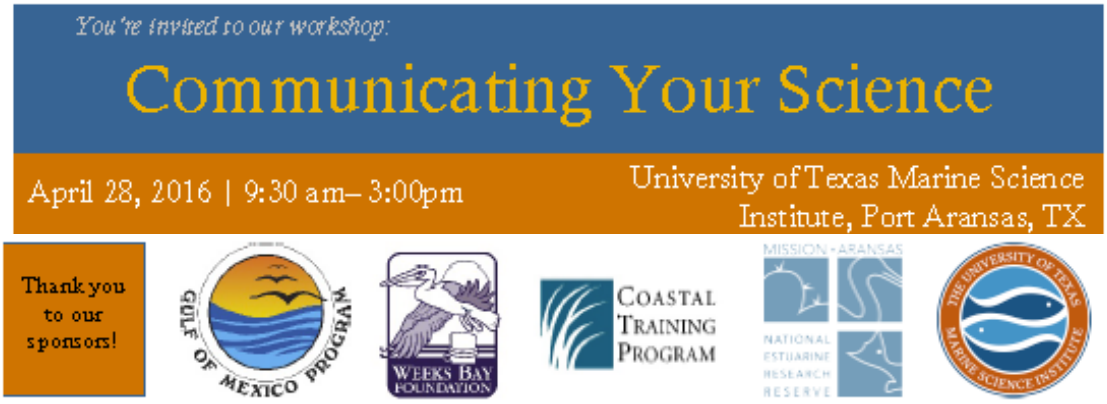
Greening the TBEM 2016

Bringing people together for a large meeting like Texas Bays and Estuaries can create significant environmental impacts. As professionals in our field, it is important for the Mission-Aransas Reserve and The University of Texas Marine Science Institute to lead by example. The following list highlights the steps we've taken to reduce the impact of TBEM 2016:

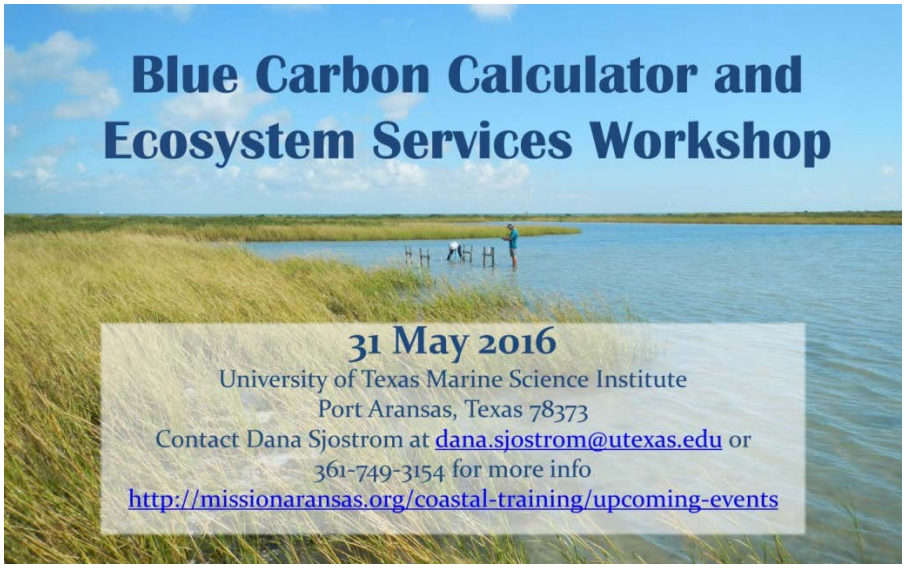
- Providing paper coffee mugs (please keep and reuse throughout day if possible)
- Convincing vendors to use Styrofoam alternatives
- Reusable bags for meeting materials
- Reusable nametag wallets
- Recycling bins provided by the UTMSI Green Team
- Limited paper use through duplex printing where possible
- Using materials with as much recycled content as possible
- Providing electronic copies of meeting materials to registered participants
- Contracting with local vendors whenever possible

To learn more about the Mission-Aransas Reserve and UTMSI efforts to reduce their environmental impact, check out the UTMSI Green Team (www.utmsi.utexas.edu/greenteam)!

Upcoming Events and Meetings



http://missionaransas.org/communicating-your-science



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